Safety services from Schmersal tec.nicum

Machine safety is a challenging and multi-layered topic, which presents real challenges not only to machine builders but also safety engineers. During the selection of safety equipment, consideration has to be given to technical aspects as well as applicable regulations and substantiated standards. This complexity often requires extensive specialist knowledge.

tec.nicum offers product and manufacturer-neutral consultation on important matters relating to machine safety and worker protection.

The four pillars of tec.nicum

- **academy**
  - Training Courses
  - Customer-specific training
  - In-house seminars
  - Presentations

- **technical**
  - Risk Analysis
  - CE conformity assessment
  - Evaluation of machines and production lines
  - Reports

- **engineering**
  - Technical planning and project management
  - Validation
  - Design of safety equipment and fences
  - Tests and measurements

- **integration**
  - Installation
  - Conversion / Retrofit

- **Education center**
- **Analysis and documentation**
- **Planning and design**
- **Practical application**
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Product overview

Introduction

Guard door monitoring

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Control devices with safety function

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Tactile safety devices

Optoelectronic safety devices

Safety-monitoring modules and safety control modules

Appendix

Important note!
The devices found in this catalog are intended to be selected, installed, integrated and maintained by trained professionals with an understanding of electrical mechanical principles and machine safe guarding standards to insure proper intended use for the specific application for which the product(s) are selected.

The technical information found in this catalog was reviewed and found to be current at the time of printing. However since product technical data can change it is always recommended to refer to the complete technical data found on the Schmersal website www.usa.schmersal.net there you will find the most current mounting and wiring instructions, wiring diagrams and detailed product drawings.
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| Enabling Switches and Control Panels | as of page 2-14 |
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| Electronic Solenoid Interlock | as of page 1-53 |
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In the United States and Canada, Schmersal is represented from locations in Hawthorne, NY and Brampton, ON. From these two warehouse locations Schmersal supports and distributes products through our established distribution network. Utilizing the combination of stocking distributors and the knowledgeable engineering sales team at Schmersal, we are always available to supply products and support customer applications.

Our vast working knowledge of local and international standards has allowed Schmersal North America to lead the way in helping customers understand the requirements for specific applications. Our trained machine safety engineers are available to guide customers through the maze of safety standards that are seen today. Whether it is a simple application or a complex safety system Schmersal can help you understand the applicable safety standards to help guide you to the appropriate product selection which is best suited for your machine or process.

Schmersal North America
Always Available

USA:  914-347-4775 salesusa@schmersal.com
Canada: 905-495-7540 salescanada@schmersal.com

The Schmersal homepage contains up-to-date information on general subjects, technical articles on machine safety as well as news regarding events and trainings.

Need a distributor? State by state listings of our 100+ distributors can be found in our contact section.

This and all our printed catalogs are available for download as PDFs. There is a video section with product demonstrations, webinar recordings, safety tutorials, and product animations.

Sign up for our newsletter, the Gatekeeper, or check our schedule of upcoming events.

Schmersal products are available through over 120 authorized distributors throughout the US and Canada. Check our website for the distributor in your area.
Following this principle Schmersal has become a leader in the design and manufacture of safe switching products and systems for various industries. In almost every field of work or industrial application there are inherent risks and different requirements for safety for man and machine.

At Schmersal we realize that every application is different and that there are specific risks and specific environmental conditions that should be considered when selecting safe guarding products. By understanding this Schmersal has developed industry specific solutions to help guide you to the best suited product or system for your application.

Innovations
For over 70 years Schmersal has developed a reputation for the design and manufacture of reliable quality products. Today with over 25,000 products in the Schmersal product portfolio, innovation remains paramount as Schmersal continuously designs and develops products to meet the demands of the never ending evolution of industry. From precision electro-mechanical position switches to patented leading edge Pulse Echo and enhanced RFID technology, Schmersal continues to lead the way in machine safety product solutions and systems.
Industries

Harvesting, drying, filleting, heating, grinding, mixing, bottling and packaging: food production involves a lot of process steps, most of which are run by machines. Not only do machine safety standards and guidelines need to be followed during these processes, safety switchgear or controlgear at the human-machine interface also have to meet strict hygiene requirements. In other areas, a high degree of temperature resistance or resistance to moisture is required. Explosion protection also plays a role in the processing of powdered raw materials or products.

Products

Schmersal has developed several products which meet protection class IP69K and use stainless steel and other ECOLAB certified materials for their enclosures: The AZM300 Solenoid interlock, safety sensors like the BNS40S, CSS30S, RSS36, our Safety Light Curtain SLC420..69, and our K series of industrial grade joysticks.

Another product group dedicated to food production is the N series of command and signalling devices. They meet the requirements of EN 1672-2 (Food processing machinery: Basic concepts - Hygiene requirements), are IP69K rated, and are now certified for use in clean rooms.

Please visit our website www.industry.schmersal.com for more information.
Machines and systems used in the packaging industry are often operated at high speed and with short cycle times. They are frequently part of the entire production and/or packaging lines. For this reason, guard systems should only interrupt production processes or negatively influence system productivity when absolutely necessary. They must also work with extreme accuracy on a 24/7 basis.

Many safety switchgears from the Schmersal Group preferred in the packaging machine building industry are designed so that unplanned stoppages of machinery are avoided. Safety switchgears with an integrated AS safety at work interface and our compact safety control PROTECT SELECT are also often used in this industry. New and innovative solenoid interlocks such as the MZM 100 and AZM 300 were also developed with the special needs of the packaging industry in mind.
The Schmersal Group has a hand in the fact that elevators are the safest transport device in the world. For many decades now we have been one of the world’s leading makers of switchgears for elevators and escalators, offering these industries a wide range of products. All lift switchgears meet relevant international requirements and operate fault-free and failproof even under adverse conditions.

We have developed specific products used for locking and safely monitoring elevator doors and in the safety circuits of elevator control systems. The product line includes floor and fine-adjustmentswitches,positive-breakdoorcontacts,positionsswitches,solenoidswitches,emergencycall systems, custom assembled top of car/inspection control boxes, as well as the USP non-contact positioning system. We have also developed custom switchgear for special tasks such as the electric shutdown of the lift system upon actuation of the speed limiter. In addition, through the merger of Böhnke & Partner with the Schmersal Group, we can offer complete control technology at the highest level of engineering and quality.

Please visit our website www.industry.schmersal.com for more information.
Industries

We have more than seven decades of experience with heavy industry as the Schmersal Group was originally a manufacturer of high-grade switchgear. Today our products are used everywhere where special requirements exist in difficult and harsh operating environments: mining, construction machinery, ship engineering, various types of cranes and hoisting devices as well as power generation.

Products

Many of the switchgears we have developed for heavy industry, differ from other series. They are very robust, oftentimes even significantly larger, and are radically designed for high durability even at extreme stresses. This product group includes our heavy position switches, foot switches, heavy-duty command devices, belt alignment switches and pull-wire emergency stop switches.

Applications

Please visit our website www.industry.schmersal.com for more information.
Machines in the metal processing industry operate with extremely high accuracy requirements at ever increasing speeds and need to be as flexible as possible. Safety switches used here should not affect machine productivity or flexibility. In addition, they must be easy to retrofit and must allow quick trouble-shooting. Protection against tampering must always be in the forefront.

Solenoid interlocks are often used in machine tool building to prevent the interruption of processes or to protect against hazards arising due to overrunning. The Schmersal Group offers a wide product range for the most diverse requirements, covering even special operating modes such as process monitoring and setting mode.

Please visit our website www.industry.schmersal.com for more information.
High degree of automation, interruption-free processes, high degree of standardization, great importance of factory standards: these, in brief, are the key features of automobile manufacturing in terms of machine safety. Another characteristic is the intensive use of robots and interlinked production lines.

Our solenoid interlock program includes systems that were specifically developed for accessible hazardous areas and offer options such as an emergency exit with emergency handle. In the control engineering field we have also developed solutions that make it almost impossible for persons to be shut inside a hazardous area. In addition, we have extensive experience in the design of safe robot workstations with or without perimeter guarding.
Safety with system:

This system has a simple structure: at field level, safety switchgear with integrated AS-Interface Safety at Work (AS-i Safety) interface are used. They are wired to a master-monitor combination or Safety Gateway modules, which can process up to 60 safe dual-channel input and output signals, through the cost-efficient installation system AS-Interface. The status and diagnostic signals can be processed by higher-level control systems and from there transmitted to control or visualization systems.

This system has many distinct advantages:
- Scalable safety solution for different machine sizes
- Smooth, fail-safe installation
- Drag & Drop configuration of the system through the ASIMON software
- Complete diagnostics of the entire safety circuit by the control system
- High operational safety through individually configurable safety-monitoring modules
- The safety functions can be effortlessly changed or extended at a later date.
- Cost-advantageous versus parallel wiring
- Complete solutions including all accessories
- Certified up to PLe/category 4 or SIL 3

AS-i Safety as basis

The basis of the Schmersal System are the tried-and-tested safety switchgear with integrated AS-i safety interface. All essential ranges of the Schmersal program are available with AS-i nodes - for instance:
- Keyed interlock switches
- Solenoid interlocks
- Safety sensors
- Emergency stop button
- Control panels
- Pull-wire emergency stop switches
- Safety foot switches.

If the desired safety switchgear is not available with integrated AS-i Safety interface, it can be simply integrated into the AS-i Safety circuit through an external input module.

More information on this system is available in our Schmersal - system solution catalog or online at www.usa.schmersal.net.
Efficient Safety:
Electronic safety devices

Safety with system:
Increased productivity has always been a major focus of real world industrial applications. Machine start up, troubleshooting, and maintenance requirements are definite costs that must be considered and minimized in order to reduce downtime and improve efficiency – and today it needs to be done while preserving the highest level of machine safety. As a leader in the world of machine safety, Schmersal realizes efficient safety is an important consideration of the design engineer and maintenance personnel.

Our latest electronic safety devices are a key in achieving efficient machine safety. At the heart of these devices is an integrated dual monitoring microprocessor which provides continuous internal function tests. Because of this, only one switch is needed per guard to meet the requirements of the highest level of safety – PLe per ISO 13849-1 or SIL3 per IEC 62061. They maintain these safety levels even when wired in series (up to 200 meters), which results in reduced cabling expense and installation time. They feature LEDs for status indication to quickly troubleshoot faults which reduces machine downtime. These devices are often available with Serial Diagnostic to communicate status via serial data packages for use in various network protocols.

Sensing technologies
Pulse Echo is a Schmersal-patented non-contact microprocessor-based technology. As the actuator approaches the sensor, the sensor excites the actuator at a predetermined resonant frequency and the reads back the actuator oscillation. The sensor evaluates the actuator frequency and its distance to the actuator. Identification of the actuator is interpreted as a closed guard by the safety sensor, and the safety outputs are enabled. Pulse Echo is used in our CSS sensors, AZ200 keyed interlock, AZM200 solenoid lock, and MZM100 electromagnetic lock.

Our RSS sensors, AZM300, and AZM400 use enhanced Radio Frequency Identification (RFID) technology. This RFID system operates on a unique frequency, so sensors will disregard non-actuator RFID signals and the passive RFID tag in the actuator will not interfere with other RFID systems such as product trackers. The RFID system is also difficult to by-pass because actuators are individually coded: The basic version of the sensor responds to any RST target actuator; The "I1" version only accepts the coded ID number of the specific target actuator which is taught in during the first start-up; The "I2" version allows the teach-in process to be repeated, allowing replacement of a lost or damaged actuator.

The non-contact operating principle of these two systems limits wear since components do not move against each other. The sensors are also tolerant of gaps and misalignments. Since the sensors and actuators are matched pairs, the technology is highly tamper resistant to ISO14119.

More information on this system is available in our Electronic Safety Sensors and Solenoid Interlocks catalog or online at www.usa.schmersal.net.
Innovations and new products for 2017

Joysticks

The new intermediate switches of the NK / RK series have a diverse range of applications: The NK version is suitable for the food processing industry thanks to its hygiene-orientated design. The RK intermediate switches, on the other hand, are ideal for use in outdoor areas and under inclement weather conditions, e.g. for systems in processing technology, aeroplane tractors or elevating work platforms.

A special feature of the NK / RK series is the new sealing system: Should there be a defect in the boot, fluid is passed through the device without the device being damaged. This contributes towards greater system availability.

- High levels of protection with IP69K and IP67
- Easily to clean thanks to hygienic design
- Quick to install with central nut and M12 plug connection

Programmable Safety Controller

The PSC1 is the latest generation of fully programmable safety controller.

- Safe logic control according to the Machinery Directive 2006/42/EC
- Safe axis monitoring according to EN 61800-5-2 for up to 12 axes
- Universal communication module:
  - Supports standard field bus systems including the safety protocols with only one hardware
  - Setting and resetting the field bus protocols by software
  - Safety protocols are enabled by a Safety Protocol Card
  - Integrated, local, safe communication (Ethernet SDDC) for connecting safe remote IOs and for a safe cross-communication
- Integrated Schmersal SD Bus connection including gateway functionality to standard field bus systems
- Acceptance of safety functionality SIL 3 according to IEC 61508 / IEC 62061, PL e and Cat 4 according to EN ISO 13849-1, EN 50178.

Passive distribution module PDM:
The passive distribution module PDM is small and compact, can be mounted easily in existing terminal boxes and is especially suitable for higher demands in hygiene with food and packaging machines.

- Can be configured easily via DIP switches
- Spring-type terminals for simple and low-cost installation
- Compact design with a width of only 45 mm on the profile rail

Passive field box PFB:
The passive field box PFB is a plug & play solution for multiple areas of applications.

- Mixed series connection possible of up to 4 electronic safety sensors or solenoid interlocks with M12, 8-pin connectors, per box
- Robust IP67 version for installation in the field
- Compact field box with dimensions 63 mm x 156 mm

Installation accessories

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- Integrated Schmersal SD Bus connection including gateway functionality to standard field bus systems
- Acceptance of safety functionality SIL 3 according to IEC 61508 / IEC 62061, PL e and Cat 4 according to EN ISO 13849-1, EN 50178.
Compact safety sensor with prewired cable with connector end (LST)

The RSS260 is one of the smallest RFID safety sensors available on the market and can be deployed in a variety of ways on account of its small size and variety of target actuators. With its very small dimensions (40 x 18 x 30 mm), it is suitable not only for installation on aluminium profiles but can also be used with many other door formats such as Plexiglas doors and panels.

Now, the RSS260 can be supplied with a connection cable with M12 plug – thereby facilitating simple connection even in areas that are difficult to reach.

- Enhanced protection against tampering to ISO 14119 through RFID technology
- Informative diagnosis function enhances availability
- Suitable for applications up to Cat. 4 / PL e / SIL 3

Solenoid interlock with integrated RFID sensor

The new AZM201 is similar in design to the AZM200, but uses RFID which makes individual coding possible (coding stage “high” in accordance with ISO 14119).

Owing to the large actuator inlet, the solenoid interlocks AZM201 are capable of compensating for a vertical offset between the actuating element and locking mechanism. This simplifies assembly and reduces the amount of time required for maintenance and adjustment of the protection device.

- Fewer additional measures necessary to prevent overriding locking devices, such as positioning out of reach or in a concealed position
- Three different coding levels from family coded to individually coded
- Suitable for applications up to Cat. 4 / PL e / SIL 3
Solutions for your industry.

Application Finder
www.applicationfinder.net/us/home/

The Application Finder displays an interactive animated packaging plant floor. Users can click on one of the work areas which will open a window with a selection of Schmersal safety switching devices that are optimal for the particular application.

Each selection ultimately links to the Schmersal online product catalog website, where users can see technical data on the selected components.

There are many product-specific animations available throughout, explaining the operation of the switch or providing recommendations for the integration of safety technology into the processes of the machine.

Also available as an app for the iPad. Download from iTunes: search Schmersal
Keyed interlock switches are used on sliding, hinged and removable guard doors that must be closed for operator safety. It is a two part system consisting of a switch body, mounted to the guard frame, and a separate actuator key, mounted to the door.

Models are available in a several mounting profiles and housing materials. Each model has a variety of actuator key options: straight, right angle mounting, floating head, and keys integrated into door handle assemblies.

**Thermoplastic housing**
- AZ17 1-2
- AZ15 1-7
- AZ16 1-8
- TZG 1-14

**Metal housings**
- AZ3350 1-16
- AZ415 1-21

**Door handle actuators**
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- AZ16-STS30 1-11
- AZ3350-STS30 1-18
- AZ200 1-20
- AZ415-STS30 1-25

**Further products and program extensions** 1-26
Safety switch with separate actuator

**AZ 17**

- Thermoplastic enclosure
- Small body
- Long life
- Double insulated
- Including cable gland M16
- Slot sealing plug included
- High level of contact reliability with low voltages and currents
- Not sensitive to dirty conditions by virtue of patented roller system
- 8 actuating planes
- Cut clamp terminals (IDC method) or connector
- EX version available

**Technical data**

- Standards: IEC/EN 60947-5-1
- Enclosure: glass fiber reinforced thermoplastic, self-extinguishing
- Actuator: stainless steel 1.4301
- Protection class: IP67 to EN 60529
- Contact material: silver
- Contact type: change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
- Switching principle: IEC 60947-5-1 slow action, NC contact with positive break
- Connection: cut clamp terminals (IDC method) or connector M12, 4-pole
- Cable section: 0.75 - 1.0 mm², flexible
- $U_{\text{imp}}$: 4 kV
- $U_i$: 250 V
- $I_{\text{the}}$: 10 A
- Utilization category: AC-15
- $I_{\text{st}}/U_i$: 4 A / 230 VAC
- Max. fuse rating: 6 A gG D-fuse
- Positive break travel: 11 mm
- Positive break force: 17 N for each NC contact fitted
- Ambient temperature: -30 °C … +80 °C
- Mechanical life: > 1 million operations
- Latching force: 30 N for ordering suffix R
- Classification:
  - Standards: EN ISO 13849-1
  - $B_{10d}$ (NC): 2,000,000
  - $B_{10d}$ (NO): 1,000,000
  - for max. 10% ohmic contact load
- Mission time: 20 years
- $MTTFd = \frac{B_{10d}}{0.1 \times n_{\text{op}}} = \frac{d_{\text{op}} \times h_{\text{op}} \times 3600 \text{ s/h}}{t_{\text{cycle}}}$

**Contact variants**

- 1 NO / 1 NC
- 2 NC

**Ordering details**

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<th>Option</th>
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<td>2</td>
<td>R</td>
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<td>Latching force 30 N</td>
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<td></td>
<td>2243-1</td>
<td>Cable gland M16</td>
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<td>5</td>
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**Note**

- Front cable output, ordering suffix -2243
- Rear cable output, ordering suffix -2243-1

**Approvals**

- CE
- UL
- GS

**Note**

Actuators must be ordered separately.
Safety switch with separate actuator

System components

Straight actuator AZ 17/170-B1

Long straight actuator AZ 17/170-B11

Mounting set MS AZ 17

With rubber mounting AZ 17/170-B1-2245

Long angled actuator AZ 17/170-B15

Connector plug

Angled actuator AZ 17/170-B5

Centering guide AZM 170-B

Tamperproof screws

Flexible actuator AZ 17-B6

Ordering details

| Straight actuator with rubber mounting | AZ 17/170-B1 |
| Angled actuator | AZ 17/170-B5 |
| Flexible actuator | AZ 17-B6 |

| Long straight actuator | AZ 17/170-B11 |
| Long angled actuator | AZ 17/170-B15 |

| Centering guide | AZM 170-B |

| Centering device |
| Mounting outside |
| Mounting inside |

(Product information see page 1-52)

| Mounting set | MS AZ 17 P |
| Connector plug | M12, 4-pole |
| Centering device | TFA-020 |
| Mounting outside | TFI-020 |

Without cable 101209950
Without cable 101208523
Tamperproof screws with unidirectional slots M4 x 8 101147463

(Quantity 2 pcs)
Safety switch with separate actuator

AZ 17-...I

- With individual coding, up to 200 combinations
- Thermoplastic enclosure
- Small body
- Long life
- Double insulated
- Including cable gland M16
- Slot sealing plug included
- High level of contact reliability with low voltages and currents
- Not sensitive to dirty conditions by virtue of patented roller system
- 8 actuating planes
- Cut clamp terminals (IDC method) or connector

Technical data

Standards: IEC/EN 60947-5-1
Enclosure: glass fiber reinforced thermoplastic, self-extinguishing
Actuator: stainless steel 1.4301
Protection class: IP67 to EN 60529
Contact material: silver
Contact type: change-over contact with double break, type 2b or 2 NC contacts, with galvanically separated contact bridges
Switching principle: IEC 60947-5-1 slow action, NC contact with positive break
Connection: cut clamp terminals (IDC method) or connector M12, 4-pole

Cable section: 0.75 - 1.0 mm², flexible
V_{imp.}: 4 kV
V_i: 250 V
I_{imp.}: 10 A
Utilization category: AC-15
I_i/U_i: 4 A / 230 VAC
Max. fuse rating: 6 A gG D-fuse
Positive break travel: 11 mm
Positive break force: 17 N for each NC contact fitted
Ambient temperature: -30 °C ... +80 °C
Mechanical life: > 1 million operations
Latching force: 30 N for ordering suffix R

Classification:

Standards: EN ISO 13849-1
B_{10d} (NC): 2,000,000
B_{10d} (NO): 1,000,000
for max. 10% ohmic contact load
Mission time: 20 years
MTTF_{Bd} = \frac{B_{10d}}{0,1 \times n_{op}}
\begin{align*}
n_{op} &= \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}
\end{align*}

Contact variants

1 NO / 1 NC
2 NC

Connector

Ordering details

AZ 17-...I

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<td></td>
<td>B5</td>
<td>Incl. actuator B5</td>
</tr>
<tr>
<td></td>
<td>B6L</td>
<td>Incl. actuator B6L</td>
</tr>
<tr>
<td></td>
<td>B6R</td>
<td>Incl. actuator B6R</td>
</tr>
<tr>
<td>5</td>
<td>1637</td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

Note

The part number of the actuator is appended to the part number of the switch. The actuators are not individually available.

For more information, see our online product catalog: www.usa.schmersal.net
# Safety switch with separate actuator

## System components

<table>
<thead>
<tr>
<th>Diagram</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Straight actuator B1" /></td>
<td>Straight actuator B1</td>
</tr>
<tr>
<td><img src="image2.png" alt="Angled actuator B5" /></td>
<td>Angled actuator B5</td>
</tr>
<tr>
<td><img src="image3.png" alt="Flexible actuator B6L" /></td>
<td>Flexible actuator B6L</td>
</tr>
<tr>
<td><img src="image4.png" alt="Flexible actuator B6R" /></td>
<td>Flexible actuator B6R</td>
</tr>
<tr>
<td><img src="image5.png" alt="Centering guide AZM 170-B" /></td>
<td>Centering guide AZM 170-B</td>
</tr>
<tr>
<td><img src="image6.png" alt="Mounting set MS AZ 17 P" /></td>
<td>Mounting set MS AZ 17 P</td>
</tr>
<tr>
<td><img src="image7.png" alt="Connector plug" /></td>
<td>Connector plug</td>
</tr>
<tr>
<td><img src="image8.png" alt="Tamperproof screws" /></td>
<td>Tamperproof screws</td>
</tr>
</tbody>
</table>

## Ordering details

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>Centering guide AZM 170-B</td>
</tr>
<tr>
<td>B5</td>
<td>Mounting set MS AZ 17 P</td>
</tr>
<tr>
<td>B6L</td>
<td>Centering device TFA-020</td>
</tr>
<tr>
<td>B6R</td>
<td>Mounting outside TF</td>
</tr>
<tr>
<td></td>
<td>Mounting inside TFI-020</td>
</tr>
<tr>
<td></td>
<td>(Product information see page 1-52)</td>
</tr>
<tr>
<td>B1</td>
<td>Connector plug M12, 4-pole</td>
</tr>
<tr>
<td></td>
<td>without cable 101209950</td>
</tr>
<tr>
<td></td>
<td>with cable 5 m 101208523</td>
</tr>
<tr>
<td>B6L</td>
<td>Tamperproof screws with</td>
</tr>
<tr>
<td></td>
<td>unidirectional slots M4 x 8</td>
</tr>
<tr>
<td></td>
<td>(Quantity 2 pcs) 101147463</td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: [www.usa.schmersal.net](http://www.usa.schmersal.net)
## Safety switch with separate actuator

### Actuator AZ 17-B25

- Door-handle actuator for safety switches with separate actuator AZ 17-…ZRK (latching)
- Ergonomic operation
- No supplementary door-handle required
- No protruding actuator
- Simple mounting
- Several door-handles available
- Possibility to mount custom handles using a default square screw (8mm)
- Mounting plate for fitting to standard profiles optionally available

### System components

- **Mounting plate**
- **Star grip**
- **T-grip**

### Note

The safety switch or solenoid interlock is not included in delivery and must be ordered separately.

Please note that you need a device with latching (R).

The technical data of the AZ 17-…ZRK safety switch can be found in this main catalog page 1-2 or in the online catalog at www.usa.schmersal.net

### Approvals

### Ordering details

<table>
<thead>
<tr>
<th>AZ 17-B25-①-②</th>
<th>Mounting plate MP AZ 17/170-B25</th>
</tr>
</thead>
<tbody>
<tr>
<td>**No.</td>
<td>Option</td>
</tr>
<tr>
<td>① L</td>
<td>Door hinge left</td>
</tr>
<tr>
<td>R</td>
<td>Door hinge right (View directed towards the inside of the hazardous area)</td>
</tr>
<tr>
<td>② G0</td>
<td>Actuator without handle</td>
</tr>
<tr>
<td>G1</td>
<td>Star grip</td>
</tr>
<tr>
<td>G2</td>
<td>T-grip</td>
</tr>
</tbody>
</table>
Safety switch with separate actuator

AZ 15

Technical data

| Standards: | IEC/EN 60947-5-1 BG-GS-ET-15 |
| Enclosure: | glass fiber reinforced thermoplastic, self-extinguishing |
| Actuator: | stainless steel 1.4301 |
| Protection class: | IP67 to EN 60529 |
| Contact material: | silver |
| Contact type: | 1 NC contact |
| Switching principle: | IEC 60947-5-1 slow action, NC contact with positive break |

Connection: screw terminals or connector M12, 4-pole

Cable section: max. 2.5 mm² min. 0.25 mm² (incl. conductor ferrules)

Cable entry: 3 x M20

U_{imp}: 6 kV

U_i: 500 V

I_{imp}: 10 A

Utilization category: AC-15, DC-13

I/U: 4 A / 230 VAC 4 A / 24 VDC

Max. fuse rating: 6 A gG D-fuse

Positive break travel: 8 mm

Positive break force: 10 N for each NC contact fitted

Ambient temperature: -30 °C … +80 °C

Mechanical life: > 1 million operations

Latching force: 30 N for ordering suffix R

Actuating speed: max. 2 m/s

Max. switching frequency: 4,000 operations/h

Classification:

Standards:

B_{10d} NC: EN ISO 13849-1 2,000,000

B_{10d} NO: 1,000,000 for max. 10% ohmic contact load

Mission time: 20 years

MTTF_d = \frac{B_{10d}}{0.1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{s/h}}{t_{cycle}}

Contact variants

1 NC

Connector

1 NC

Ordering details

<table>
<thead>
<tr>
<th>AZ15-ZV(1)K-2-(3)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>Option</td>
</tr>
<tr>
<td>1</td>
<td>R</td>
</tr>
<tr>
<td>2</td>
<td>ST</td>
</tr>
<tr>
<td>3</td>
<td>2254</td>
</tr>
<tr>
<td></td>
<td>1762</td>
</tr>
<tr>
<td></td>
<td>1637</td>
</tr>
</tbody>
</table>

Note

Actuators must be ordered separately. see page 1-9 for actuators
Safety switch with separate actuator

**AZ 16**

- Thermoplastic enclosure
- Long life
- Double insulated
- 3 cable entries M20
- Large wiring compartment
- High level of contact reliability with low voltages and currents
- Not sensitive to dirty conditions by virtue of patented roller system
- Available with LED
- Slotted holes for adjustment, circular holes for location
- EX version available
- AS-Interface Safety at Work available

### Technical data

| Standards: | IEC/EN 60947-5-1 BG-GS-ET-15 |
| Actuator: | Stainless steel 1.4301 |
| Protection class: | IP67 to EN 60529 |
| Contact material: | Silver |
| Contact type: | Change-over contact with double break, type Zb or 2 NC or 3 NC contacts, with galvanically separated contact bridges |
| Switching principle: | IEC 60947-5-1 slow action, NC contact with positive break |
| Connection: | Screw terminals or connector M12, 4-pole |
| Cable section: | Max. 2.5 mm² min. 0.25 mm² (incl. conductor ferrules) |
| Cable entry: | 3 x M20 |
| Uimp: | 6 kV |
| U: | 500 V |
| Iimp: | 10 A |
| Utilization category: | AC-15, DC-13 |
| I/U: | 4 A / 230 VAC 4 A / 24 VDC |
| Max. fuse rating: | 6 A (D-fuse) |
| Positive break travel: | 8 mm |
| Positive break force: | 10 N for each NC contact fitted |
| Ambient temperature: | -30 °C … +80 °C |
| Mechanical life: | > 1 million operations |
| Latching force: | 30 N for ordering suffix R |
| Actuating speed: | Max. 2 m/s |
| Maximum switching frequency: | 4,000 operations/h |

### Contact variants

<table>
<thead>
<tr>
<th>1 NO / 1 NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 NC</td>
</tr>
<tr>
<td>3 NC</td>
</tr>
<tr>
<td>1 NO / 2 NC</td>
</tr>
</tbody>
</table>

### Approval

- UL
- CE

### Ordering details

#### AZ16-(ZV)K-(3-4-5)

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 NO / 1 NC</td>
<td>02</td>
</tr>
<tr>
<td>2</td>
<td>2 NC</td>
<td>03</td>
</tr>
<tr>
<td>3</td>
<td>3 NC</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>Ejection force</td>
<td>R</td>
</tr>
<tr>
<td>5</td>
<td>Latching force 30 N</td>
<td>G24</td>
</tr>
<tr>
<td>6</td>
<td>Cable entry M20</td>
<td>M16</td>
</tr>
<tr>
<td>7</td>
<td>Connector M12 bottom</td>
<td>ST</td>
</tr>
<tr>
<td>8</td>
<td>Connector M12 left</td>
<td>STL</td>
</tr>
<tr>
<td>9</td>
<td>Connector M12 right</td>
<td>STR</td>
</tr>
</tbody>
</table>

#### AZ16-(ZV)K-(3-4-5)

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Latching force 5 N</td>
<td>2254</td>
</tr>
<tr>
<td>11</td>
<td>Front mounting</td>
<td>1762</td>
</tr>
<tr>
<td>12</td>
<td>Gold-plated contacts</td>
<td>1637</td>
</tr>
</tbody>
</table>

**LED version:**

Ordering suffix G24, only available for version with one NO and one NC contact. Protected against incorrect polarity and voltage spikes.

---

**Note**

Actuators must be ordered separately.
Safety switch with separate actuator

System components

Straight actuator AZ 15/16-B1

AZ 15/16-B1-1747 with magnetic latch

Ordering details

Straight actuator with magnetic latch

AZ 15/16-B1

AZ 15/16-B1-1747

AZ 15/16-B1-2024 with slot lip-seal

AZ 15/16-B1-2053 with ball latch

Flexible actuator AZ 15/16-B2

AZ 15/16-B2-1747 with magnetic latch

Ordering details

Flexible actuator with magnetic latch

AZ 15/16-B3

AZ 15/16-B3-1747

Flexible actuator AZ 15/16-B6

AZ 15/16-B6-2177

Door handle actuator with or without emergency handle

A detailed product description can be found on page 1-11
### Safety switch with separate actuator

#### System components

<table>
<thead>
<tr>
<th>Item</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting set MS AZ 15/16</td>
<td><img src="image" alt="Mounting set MS AZ 15/16" /></td>
</tr>
<tr>
<td>Front mounting AZ 15/16 -1762</td>
<td><img src="image" alt="Front mounting AZ 15/16" /></td>
</tr>
<tr>
<td>Lockout tag SZ 16/335</td>
<td><img src="image" alt="Lockout tag SZ 16/335" /></td>
</tr>
<tr>
<td>Connector plug</td>
<td><img src="image" alt="Connector plug" /></td>
</tr>
<tr>
<td>Slot sealing plug AZ 15/16-1476</td>
<td><img src="image" alt="Slot sealing plug AZ 15/16-1476" /></td>
</tr>
<tr>
<td>Ball catch AZ 15/16-2053-2</td>
<td><img src="image" alt="Ball catch AZ 15/16-2053-2" /></td>
</tr>
<tr>
<td>AZ15/16-B1-KRH</td>
<td><img src="image" alt="AZ15/16-B1-KRH" /></td>
</tr>
</tbody>
</table>

#### Ordering details

<table>
<thead>
<tr>
<th>Item</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting set</td>
<td>MS AZ 15/16 P</td>
<td>Front mounting with M5 nuts</td>
</tr>
<tr>
<td></td>
<td>MS AZ 15/16 R/P</td>
<td></td>
</tr>
<tr>
<td>Lockout tag SZ 16/335</td>
<td>SZ 16/335</td>
<td></td>
</tr>
<tr>
<td>Slot sealing plug</td>
<td>AZ 15/16-1476</td>
<td></td>
</tr>
<tr>
<td>Ball catch</td>
<td>AZ 15/16-2053-2</td>
<td></td>
</tr>
<tr>
<td>Tamperproof screws</td>
<td></td>
<td>(Quantity 2 pcs)</td>
</tr>
<tr>
<td></td>
<td>MS AZ 15/16-1762</td>
<td></td>
</tr>
<tr>
<td>Connector plug M12</td>
<td></td>
<td>(Quantity 2 pcs)</td>
</tr>
<tr>
<td>4-pole</td>
<td>101209950</td>
<td>without cable</td>
</tr>
<tr>
<td>8-pole</td>
<td>101208523</td>
<td>with cable 5 m</td>
</tr>
<tr>
<td>Connector plug M12</td>
<td></td>
<td>(Quantity 2 pcs)</td>
</tr>
<tr>
<td>8-pole</td>
<td>103011412</td>
<td>with cable 5 m</td>
</tr>
<tr>
<td>Tamperproof screws</td>
<td></td>
<td>(Quantity 2 pcs)</td>
</tr>
<tr>
<td>M5 x 12</td>
<td>101135338</td>
<td>with unidirectional slots</td>
</tr>
<tr>
<td>M5 x 16</td>
<td>101135339</td>
<td></td>
</tr>
<tr>
<td>M5 x 20</td>
<td>101135340</td>
<td></td>
</tr>
<tr>
<td>Key removal handle</td>
<td>AZ15/16-B1-KRH</td>
<td>assembly</td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: www.usa.schmersal.net
Safety switch with separate actuator

AZ 16-STS30-...

System variants

| AZ 16-STS30-01 | | |
| AZ 16-STS30-02 | | |
| AZ 16-STS30-03 | | |
| AZ 16-STS30-04 | | |
| AZ 16-STS30-05 | | |
| AZ 16-STS30-06 | | |
| AZ 16-STS30-07 | | |
| AZ 16-STS30-08 | | |

System components

| Lockout tag SZ 415-1/2 |
| Lockout tag SZ 415-1/2 -2477 |
| Centering device TF. |
| Mounting plate MP TG-01 |

Ordering details

Included in delivery
- Mounting plate for safety switch
- Actuator incl. mounting plate
- Emergency handle (for variant -05 and -06 incl. mounting plate)

Ordering example
To order, first choose the desired safety switch and then the door handle system:
for example AZ 16-02ZVRK-ST and AZ 16-STS30-01.

Mounting inside

AZ 16 STS30-02/-04/-05/-07

Mounting outside

AZ 16 STS30-01/-03/-06/-08

The drawings are always shown with a view to the switch.

Ordering details

Mounting inside
- with emergency handle
  - door hinge right: AZ 16-STS30-01
  - door hinge left: AZ 16-STS30-02

- without emergency handle
  - door hinge right: AZ 16-STS30-03
  - door hinge left: AZ 16-STS30-04

Mounting outside
- with emergency handle
  - door hinge right: AZ 16-STS30-05
  - door hinge left: AZ 16-STS30-06

- without emergency handle
  - door hinge right: AZ 16-STS30-07
  - door hinge left: AZ 16-STS30-08

Ordering details

Lockout tag for STS30-01/-03/-06/08: SZ 415-1
- for STS30-02/-04/-05/07: SZ 415-2

Lockout tag with 5 circular holes
- for STS30-01/-03/-06/08: SZ 415-1-2477
- for STS30-02/-04/-05/07: SZ 415-2-2477

Centering device only for AZ 16-STS30...
and AZM 161-STS30...:
- Mounting outside: TFA-020
- Mounting inside: TFI-020
- (Product information see page 1-52)
- Mounting plate: MP TG-01

Mounting plate MP TG-01
Safety switch with separate actuator

AZ 16-...I

- With individual coding, up to 600 combinations
- Thermoplastic enclosure
- Long life
- Double insulated
- 3 cable entries M16
- Large wiring compartment
- High level of contact reliability with low voltages and currents
- Not sensitive to dirty conditions by virtue of patented roller system
- Slotted holes for adjustment, circular holes for location

Technical data

| Standards: | IEC/EN 60947-5-1  |
| Enclosure:  | glass fiber reinforced thermoplastic, self-extinguishing |
| Actuator:   | stainless steel 1.4301 |
| Protection class: | IP67 to EN 60529 |
| Contact material: | silver |
| Contact type: | change-over contact with double break, type Zb or 2 NC or 3 NC contacts, with galvanically separated contact bridges |
| Switching principle: | IEC 60947-5-1 slow action, NC contact with positive break |
| Connection: | screw terminals or connector M12, 4-pole |
| Cable section: | max. 2.5 mm² min. 0.25 mm² (incl. conductor ferrules) |
| Cable entry: | 3 x M20 |
| U_{imp}: | 6 kV |
| U_{i}: | 500 V |
| I_{nc}: | 10 A |
| Utilization category: | AC-15, DC-13 |
| I/U_{i}: | 4 A / 230 VAC |
| | 4 A / 24 VDC |
| Max. fuse rating: | 6 A gG D-fuse |
| Positive break travel: | 8 mm |
| Positive break force: | 10 N for each NC contact fitted |
| Ambient temperature: | -30 °C ... +80 °C |
| Mechanical life: | > 1 million operations |
| Latching force: | 30 N for ordering suffix R |
| Actuating speed: | max. 0.2 m/s |
| Max. switching frequency: | 4,000 operations/h |

Classification:

| Standards: | EN ISO 13849-1 |
| B_{11a} (NC): | 2,000,000 |
| B_{11a} (NO): | 1,000,000 |

for max. 10% ohmic contact load

Mission time: 20 years

MTTF = \frac{B_{11a}}{0.1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}

Note

The actuating direction of the actuator is identified by means of the marking on the enclosure.

The part number of the actuator is appended to the part number of the switch. The actuators are not individually available.

Approvals

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03</td>
<td>3 NC</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>1 NO / 2 NC</td>
<td></td>
</tr>
<tr>
<td>B1</td>
<td>Incl. actuator B1</td>
<td></td>
</tr>
<tr>
<td>B1-1747</td>
<td>Incl. actuator B1-1747</td>
<td></td>
</tr>
<tr>
<td>B1-2024</td>
<td>Incl. actuator B1-2024</td>
<td></td>
</tr>
<tr>
<td>B1-2053</td>
<td>Incl. actuator B1-2053</td>
<td></td>
</tr>
<tr>
<td>B1-2177</td>
<td>Incl. actuator B1-2177</td>
<td></td>
</tr>
<tr>
<td>1762</td>
<td>Front mounting</td>
<td></td>
</tr>
<tr>
<td>M16</td>
<td>Cable entry M16</td>
<td></td>
</tr>
<tr>
<td>M20</td>
<td>Cable entry M20</td>
<td></td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: www.usa.schmersal.net
Safety switch with separate actuator

System components

<table>
<thead>
<tr>
<th>Straight actuator B1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator B1-1747 with magnetic latch</td>
</tr>
<tr>
<td>Actuator B1-2024 with slot lip-seal</td>
</tr>
<tr>
<td>Actuator B1-2053 with ball latch</td>
</tr>
</tbody>
</table>

System components

<table>
<thead>
<tr>
<th>Actuator B1-2177 with centering guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centering device TF.</td>
</tr>
<tr>
<td>Ball catch AZ 15/16-2053-2</td>
</tr>
<tr>
<td>Front mounting -1762</td>
</tr>
</tbody>
</table>

System components

<table>
<thead>
<tr>
<th>Mounting set MS AZ 15/16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting set MS AZ 15/16 R/P</td>
</tr>
<tr>
<td>Ball catch MS AZ 15/16-2053-2</td>
</tr>
<tr>
<td>Front mounting with M5 nuts AZ 15/16-2053-2</td>
</tr>
<tr>
<td>Tamperproof screws with unidirectional slots M5 x 12 101135338</td>
</tr>
<tr>
<td>Tamperproof screws with unidirectional slots M5 x 16 101135339</td>
</tr>
<tr>
<td>Tamperproof screws with unidirectional slots M5 x 20 101135340</td>
</tr>
</tbody>
</table>

Ordering details

<table>
<thead>
<tr>
<th>Ordering details</th>
<th>Straight actuator B1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight actuator with magnetic latch B1</td>
<td></td>
</tr>
<tr>
<td>Straight actuator with centering guide B1-2177</td>
<td></td>
</tr>
<tr>
<td>Centering device TFA-020 TFI-020</td>
<td></td>
</tr>
<tr>
<td>Mounting outside</td>
<td></td>
</tr>
<tr>
<td>Mounting inside (Product information see page 1-52)</td>
<td></td>
</tr>
<tr>
<td>(Quantity 2 pcs)</td>
<td></td>
</tr>
</tbody>
</table>
Safety switch with separate actuator

**TZG**

- Thermoplastic enclosure
- 2 contacts
- Long life
- High level of contact reliability with low voltages and currents
- Mounting details to EN 50041
- Actuator heads can be repositioned in steps 4 x 90°
- Can be mounted on a flat surface
- Funnel shaped key entry
- Padlockable actuator key

**Technical data**

- Standards: IEC/EN 60947-5-1
- Enclosure: glass fiber reinforced thermoplastic
- Actuator: galvanized steel
- Protection class: IP67
- Contact material: silver
- Contact type: double pole, double break with electrically separated contact bridges
- Switching principle: IEC 60947-5-1
- Long life
- High level of contact reliability with low voltages and currents
- Mounting details to EN 50041
- Actuator heads can be repositioned in steps 4 x 90°
- Can be mounted on a flat surface
- Funnel shaped key entry
- Padlockable actuator key

**Contact variants**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>103</td>
<td>1 NO &amp; 1 NC</td>
<td></td>
</tr>
<tr>
<td>110</td>
<td>2 NC</td>
<td></td>
</tr>
</tbody>
</table>

**Ordering details**

- TZG01-

**Note**

Actuators must be ordered separately.

**Note**

By turning the head in 4 x 90° steps, 4 actuating planes are possible. A Torx T15 screwdriver is needed for this purpose.
Solenoid interlocks

**System components**

- **Straight actuator TZ/CO**
- **Flexible actuator TZ/COF/HIS.1**
- **Shortened straight actuator TZ/CK**
- **Angled actuator TZ/CW**
- **Flexible actuator TZ/COF/HIS.2**
- **Shortened angled actuator TZ/CWK**
- **Straight radius actuator TZ/COR**
- **Flexible actuator TZ/CORF/HIS.1**
- **Angled radius actuator TZ/CWR**
- **Flexible actuator TZ/CORF/HIS.2**

**Ordering details**

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight actuator</td>
<td>TZ/CO</td>
</tr>
<tr>
<td>Angled actuator</td>
<td>TZ/CW</td>
</tr>
<tr>
<td>Straight radius actuator</td>
<td>TZ/COR</td>
</tr>
<tr>
<td>Angled radius actuator</td>
<td>TZ/CWR</td>
</tr>
<tr>
<td>Flexible actuator</td>
<td>TZ/COF/HIS.1</td>
</tr>
<tr>
<td>Flexible actuator</td>
<td>TZ/COF/HIS.2</td>
</tr>
<tr>
<td>Flexible actuator</td>
<td>TZ/COF/HIS.1</td>
</tr>
<tr>
<td>Flexible actuator</td>
<td>TZ/COF/HIS.2</td>
</tr>
<tr>
<td>Shortened straight actuator</td>
<td>TZ/CK</td>
</tr>
<tr>
<td>Shortened angled actuator</td>
<td>TZ/CWK</td>
</tr>
<tr>
<td>Centering device</td>
<td>TFA-020</td>
</tr>
<tr>
<td>Mounting outside</td>
<td>TFI-020</td>
</tr>
<tr>
<td>Mounting inside</td>
<td>(Product information see page 1-52)</td>
</tr>
</tbody>
</table>
Safety switch with separate actuator

**AZ 3350**

- Metal enclosure
- 3 contacts
- Long life
- High level of contact reliability with low voltages and currents
- Mounting details to EN 50041
- Actuator heads can be repositioned in steps 4 x 90°
- Can be mounted on a flat surface
- Slotted holes for adjustment, circular holes for location
- EX version available

### Technical data

**Standards:**
- IEC/EN 60947-5-1
- BG-GS-ET-15

**Enclosure:**
- light-alloy diecast, paint finish

**Actuator:**
- steel

**Protection class:**
- IP67

**Contact material:**
- silver

**Contact type:**
- change-over contact with double break, type Zb or 3 NC contacts, with galvanically separated contact bridges

**Switching principle:**
- IEC 60947-5-1 slow action, NC contact with positive break

**Connection:**
- screw terminals

**Cable section:**
- max. 2.5 mm², min. 0.75 mm² (incl. conductor ferrules)

**Cable entry:**
- M20

**U_{imp}:**
- 4 kV

**U_{i}:**
- 250 V

**I_{the}:**
- 10 A

**Utilization category:**
- AC-15; DC-13

**I_{th}/U_{i}:**
- 4 A / 230 VAC
- 4 A / 24 VDC

**Max. fuse rating:**
- 6 A gG D-fuse

**Positive break travel:**
- 10.7 mm

**Positive break force:**
- 5 N for each NC contact fitted

**Ambient temperature:**
- -30 °C … +90 °C

**Mechanical life:**
- > 1 million operations

**Latching force:**
- max. 0.2 m/s

**Max. switching frequency:**
- 1,200 operations/h

**Classification:**

<table>
<thead>
<tr>
<th>Standards</th>
<th>EN ISO 13849-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>B_{off} (NC)</td>
<td>2,000,000</td>
</tr>
<tr>
<td>B_{off} (NO)</td>
<td>1,000,000</td>
</tr>
</tbody>
</table>

- for max. 10% ohmic contact load

**Mission time:**
- 20 years

**MTTF_{Bd}**

<table>
<thead>
<tr>
<th>B_{off}</th>
<th>n_{op}</th>
<th>d_{op} x h_{op} x 3600 s/h</th>
<th>t_{cycle}</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>n_{op}</td>
<td>d_{op} x h_{op} x 3600 s/h</td>
<td>t_{cycle}</td>
</tr>
</tbody>
</table>

**Note:**

Actuators must be ordered separately.

### Contact variants

<table>
<thead>
<tr>
<th>1 NO / 2 NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td>21</td>
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<tr>
<td>22</td>
</tr>
<tr>
<td>31</td>
</tr>
<tr>
<td>32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3 NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td>21</td>
</tr>
<tr>
<td>22</td>
</tr>
<tr>
<td>31</td>
</tr>
<tr>
<td>32</td>
</tr>
</tbody>
</table>

### Note

By turning the head in 4 x 90° steps, 4 actuating planes are possible. A Torx T15 tool is needed for this purpose.

---

For more information, see our online product catalog: www.usa.schmersal.net
### Safety switch with separate actuator

#### System components

<table>
<thead>
<tr>
<th>Order</th>
<th>Diagram</th>
<th>Details</th>
</tr>
</thead>
</table>
| AZ 3350-B1 | ![AZ 3350-B1](image) | | System components

<table>
<thead>
<tr>
<th>Order</th>
<th>Diagram</th>
<th>Details</th>
</tr>
</thead>
</table>
| AZ 3350-B5 | ![AZ 3350-B5](image) | | System components

<table>
<thead>
<tr>
<th>Order</th>
<th>Diagram</th>
<th>Details</th>
</tr>
</thead>
</table>
| AZ 3350-B1R | ![AZ 3350-B1R](image) | | System components

<table>
<thead>
<tr>
<th>Order</th>
<th>Diagram</th>
<th>Details</th>
</tr>
</thead>
</table>
| AZ 3350-B5R | ![AZ 3350-B5R](image) | | System components

#### Ordering details

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Model Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator</td>
<td>AZ 3350-B1</td>
</tr>
<tr>
<td>Actuator</td>
<td>AZ 3350-B5</td>
</tr>
<tr>
<td>Actuator</td>
<td>AZ 3350-B1R</td>
</tr>
<tr>
<td>Actuator</td>
<td>AZ 3350-B5R</td>
</tr>
</tbody>
</table>

The actuators are not suitable for explosive areas.

<table>
<thead>
<tr>
<th>Actuator</th>
<th>Model Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator</td>
<td>AZ 3350-B6</td>
</tr>
<tr>
<td>Actuator</td>
<td>AZ 3350-B6H</td>
</tr>
</tbody>
</table>

The actuators are not suitable for explosive areas.

#### Centering device

- Mounting outside: TFA-020
- Mounting inside: TFI-020

(Product information see page 1-52)
Safety switch with separate actuator

**AZ 3350-STS30-...**

### Technical data

- **Standards:** IEC/EN 60947-5-1, EN ISO 13849-1, EN 1088, BG-GS-ET-15
- **Enclosure:** light-alloy diecast, paint finish
- **Protection class:** IP67
- **Contact material:** silver
- **Contact type:** change-over contact with double break Zb or 3 NC contacts, with galvanically separated contact bridges
- **Switching principle:** IEC 60947-5-1; slow action, NC contact with positive break
- **Connection:** screw terminals
- **Cable section (rigid/flexible):** min. 0.75 mm²; max. 2.5 mm² (incl. conductor ferrules)
- **Cable entry:** M20
- **Uimp:** 4 kV
- **Ue:** 250 V
- **Iimp:** 10 A
- **Utilization category:** AC-15, DC-13
- **Ie/Ue:** 4 A / 230 VAC; 4 A / 24 VDC
- **Max. fuse rating:** 6 A gG D-fuse (DIN EN 60269-1)
- **Ambient temperature:** -30 °C … +90 °C
- **Mechanical life:** > 1 million operations
- **Actuating speed:** max. 0.2 m/s
- **Switching frequency:** 1,200 operations / h
- **Positive break travel:** 10.7 mm
- **Positive break force:** 5 N for each NC contact fitted
- **Classification:**
  - Standards: EN ISO 13849-1
  - B10d (NC): 2,000,000
  - B10d (NO): 1,000,000
  - for max. 10% ohmic contact load
  - Mission time: 20 years

### System variants

- **AZ 3350 STS30-02/-04/-05/-07**
- **AZ 3350 STS30-01/-03/-06/-08**

### Note

- **Included in delivery**
  - Mounting plate for safety switch
  - Actuator incl. mounting plate
  - Emergency handle (for variant -05 and -06 incl. mounting plate)

- **Ordering example**
  To order, first choose the desired safety switch and then the door handle system:
  - for example AZ 3350-12-ZUEK-U90 and AZ 3350-STS30-02

### Note

- **Actuator head:**
  - 90°
  - 270°

---

### Approvals

- UL
- CE

### Ordering details

<table>
<thead>
<tr>
<th>AZ 3350-①-②-③</th>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03-ZK</td>
<td>①</td>
<td>03 NC</td>
<td>3 NC</td>
</tr>
<tr>
<td>12-ZUEK</td>
<td>②</td>
<td>12 ZK</td>
<td>1 NO/2 NC</td>
</tr>
<tr>
<td>1637</td>
<td></td>
<td>1637</td>
<td>Gold-plated contacts</td>
</tr>
<tr>
<td>U90</td>
<td>③</td>
<td>U90</td>
<td>Actuating head can be rotated 90° for door hinge left, can be rotated 270° for door hinge right</td>
</tr>
<tr>
<td>U270</td>
<td></td>
<td>U270</td>
<td></td>
</tr>
</tbody>
</table>
Safety switch with separate actuator

### System variants

<table>
<thead>
<tr>
<th>AZ 3350-STS30-01</th>
</tr>
</thead>
</table>
| ![AZ 3350-STS30-01 diagram](image1)

<table>
<thead>
<tr>
<th>AZ 3350-STS30-02</th>
</tr>
</thead>
</table>
| ![AZ 3350-STS30-02 diagram](image2)

<table>
<thead>
<tr>
<th>AZ 3350-STS30-03</th>
</tr>
</thead>
</table>
| ![AZ 3350-STS30-03 diagram](image3)

<table>
<thead>
<tr>
<th>AZ 3350-STS30-04</th>
</tr>
</thead>
</table>
| ![AZ 3350-STS30-04 diagram](image4)

<table>
<thead>
<tr>
<th>AZ 3350-STS30-05</th>
</tr>
</thead>
</table>
| ![AZ 3350-STS30-05 diagram](image5)

<table>
<thead>
<tr>
<th>AZ 3350-STS30-06</th>
</tr>
</thead>
</table>
| ![AZ 3350-STS30-06 diagram](image6)

<table>
<thead>
<tr>
<th>AZ 3350-STS30-07</th>
</tr>
</thead>
</table>
| ![AZ 3350-STS30-07 diagram](image7)

<table>
<thead>
<tr>
<th>AZ 3350-STS30-08</th>
</tr>
</thead>
</table>
| ![AZ 3350-STS30-08 diagram](image8)

The drawings are always shown with a view to the switch.

### System components

- **Ordering details**
  - **Mounting inside**
    - with emergency handle: AZ 3350-STS30-01
    - door hinge right: AZ 3350-STS30-02
    - door hinge left: AZ 3350-STS30-03
  - without emergency handle: AZ 3350-STS30-04
    - door hinge right: AZ 3350-STS30-05
    - door hinge left: AZ 3350-STS30-06

- **Mounting outside**
  - with emergency handle: AZ 3350-STS30-07
    - door hinge right: AZ 3350-STS30-08

- **Ordering details**
  - Lockout tag: S 415-1/-2
    - for ...STS30-01/-03/-06/-08: S 415-1
    - for ...STS30-02/-04/-05/-07: S 415-2
  - Lockout tag with 5 circular holes: S 415-1-2477/-2477
    - for ...STS30-01/-03/-06/-08: S 415-1-2477
    - for ...STS30-02/-04/-05/-07: S 415-2-2477
  - Centering device: TFA-010/TFI-010
    - Mounting outside: TFA-010
    - Mounting inside: TFI-010

(Product information see page 1-52)
Electronic Safety switch with separate actuator

AZ 200

Technical data

Standards: EN 60947-5-3, EN ISO 13849-1, IEC 61508
Enclosure: glass fiber reinforced thermoplastic, self-extinguishing
Mechanical life: ≥ 1 million operations
Holding force: 30 N
Protection class: IP67 to EN 60529
Protection class: II, II
Overvoltage category: III
Degree of pollution: 3
Connection: screw terminals or cage clamps or connector M12 or M23
Cable section: min. 0.25 mm², max. 1.5 mm² (incl. conductor ferrules)
Cable entry: M20
Series-wiring: max. 31 components
(Cable length and cable section alter the voltage drop depending on the output current)
Switching distances to EN 60947-5-3:
Sn: 6.5 mm
Sao: 4.0 mm
Sar: 30 mm
Hysteresis: max. 1.5 mm
Repeat accuracy: < 0.5 mm
Switching frequency f: 1 Hz
Ambient conditions:
Ambient temperature: -25 °C … +70 °C
Storage and transport temperature: -25 °C … +85 °C
Relative humidity: 30% … 95%, non-condensing
Resistance to vibration: 10 … 55 Hz, amplitude 1 mm
Resistance to shock: 30 g / 11 ms
Switching frequency f: 1 Hz
Response time: < 60 ms
Duration of risk: < 120 ms
Time to readiness: < 4 s
Actuating speed: ≤ 0.2 m/s

Note

The safety switch and the actuator unit must be ordered separately! (refer to page 1-56 – 1-59)

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>➀ SK</td>
<td>Screw terminals</td>
<td></td>
</tr>
<tr>
<td>① CC</td>
<td>Cage clamps</td>
<td></td>
</tr>
<tr>
<td>① ST1</td>
<td>Connector M23, (8+1)-pole Stecker M12, 8-polig</td>
<td></td>
</tr>
<tr>
<td>① ST2</td>
<td>1 diagnostic output and 2 safety outputs, all p-type</td>
<td></td>
</tr>
<tr>
<td>② 1P2P</td>
<td>serial diagnostic output and 2 safety outputs, p-type</td>
<td></td>
</tr>
<tr>
<td>② SD2P</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Electrical data:

Ue: 24 VDC -15%/+10% (stabilised PELV)
Ie: 0.7 A
Ie: max. 0.1 A
Uimp: 800 V
U: 32 VDC
Fuse rating:
- Screw terminals or cage clamps: ≤ 4 A when used to UL 508;
- Connector M12 or M23: ≤ 2 A
Safety inputs X1 and X2:
- only for -1P2P and -SD2P
Ux1,x2: - 3 V … 5 V
Ux3HP: 15 V … 30 V
Ic: typically 2 mA at 24 V
Safety outputs Y1 and Y2:
p-type, short-circuit proof
Ue1: 0 V up to 4 V under Ue
Ie1: max. 0.25 A
Utilization category: DC-13
Leakage current Ir: ≤ 0.5 mA
Diagnostic output OUT:
p-type, short-circuit proof
Ue2: 0 V up to 4 V under Ue
Ie2: max. 0.05 A
Utilization category: DC-13
Wiring capacitance for serial diagnostic: max. 50 nF

LED functions:

Green: Supply voltage on
Yellow: Operating status
Red: Error (refer to flash codes)

Classification:

| Standards: | EN ISO 13849-1; IEC 61508 |
| PL: | e |
| Category: | 4 |
| PFH value: | 4.0 x 10⁻⁵ /h |
| SIL: | suitable for SIL 3 applications |
| Mission time: | 20 years |

Approvals

TUV

For more information, see our online product catalog: www.usa.schmersal.net
Safety switch with separate actuator

**AZ 415**

- Metal enclosure
- 2 switches with different actuating functions in a single enclosure
- Long life
- High level of contact reliability with low voltages and currents
- 2 cable entries M20
- Adjustable ball latch to 400 N
- Spring-loaded actuators
- EX version available

### Technical data

- **Standards:** IEC/EN 60947-5-1
- **Enclosure:** light-alloy diecast, paint finish
- **Actuator:** zinc-plated brass/aluminum
- **Protection class:** IP67 to EN 60529
- **Contact material:** silver change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
- **Switching principle:** IEC 60947-5-1 slow action, NC contact with positive break
- **Connection:** screw terminals
- **Cable section:** max. 1.5 mm², min. 0.75 mm² (incl. conductor ferrules)
- **Cable entry:** 2 x M20
- **U_{imp}:** 4 kV
- **U_{i}:** 250 V
- **I_{per}:** 6 A
- **Utilization category:** AC-15; DC-13
- **I_{per}/U_{i}:** 4 A / 230 VAC
- **Max. fuse rating:** 6 A gG D-fuse
- **Positive break travel:** 3.8 mm
- **Positive break force:** min. 31 N
- **Ambient temperature:** -25 °C ... +70 °C
- **Mechanical life:** > 1 million operations
- **Latching force:** 30 ... 400 N (adjustable)

### Contact variants

- **1 NO / 1 NC**
- **2 NO**
- **2 NC**

### Note

Actuators must be ordered separately (refer to page 1-24).

### Approvals

### Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>02/11</td>
<td>2NC / 1NO 1NC</td>
</tr>
<tr>
<td>②</td>
<td>02/02</td>
<td>2NC / 2NC</td>
</tr>
<tr>
<td>①</td>
<td>02/20</td>
<td>2NC / 2NO</td>
</tr>
<tr>
<td>①</td>
<td>11/11</td>
<td>1NO 1NC / 1NO 1NC</td>
</tr>
<tr>
<td>②</td>
<td>1637</td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

### Contact symbols shown for the closed condition of the guard device.

For more information, see our online product catalog: www.usa.schmersal.net
Safety switch with separate actuator

AZ 415-33

Technical data

- Standards: IEC/EN 60947-5-1
- Enclosure: light-alloy diecast, paint finish
- Actuator: zinc-plated brass/aluminum
- Protection class: IP67 to EN 60529
- Contact material: silver
- Contact type: change-over contact with double break, type Zb, with galvanically separated contact bridges
- Switching principle:  IEC 60947-5-1 slow action, NC contact with positive break
- Connection: screw terminals
- Cable section: max. 1.5 mm², min. 0.75 mm² (incl. conductor ferrules)
- Cable entry: 2 x M20
- Uimp: 4 kV
- U_i: 250 V
- I_{th,H}: 6 A
- Utilization category: AC-15; DC-13
- I/U_i: 4 A / 230 VAC, 4 A / 24 VDC
- Max. fuse rating: 6 A gG D-fuse
- Positive break travel: 5.5 mm
- Positive break force: min. 15 N
- Ambient temperature: -25 °C … +80 ºC
- Mechanical life: > 1 million operations
- Latching force: 30 … 400 N (adjustable)
- Classification:
  - Standards: EN ISO 13849-1
  - B_{10d} (NC): 2,000,000
  - B_{10d} (NO): 1,000,000
  - for max. 10% ohmic contact load
- Mission time: 20 years
- MTTF_s = \frac{B_{10d}}{0.1 \times n_p}
- \eta_p = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}

Contact variants

- 3 NO
- 3 NC

Contact symbols shown for the closed condition of the guard device.

Note

Actuators must be ordered separately (refer to page 1-24).

Approvals

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1637</td>
<td></td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

Note

Contact symbols shown for the closed condition of the guard device.
Safety switch with separate actuator

AZ 415-33 for double doors

- Metal enclosure
- 3 switches with different actuating functions in one enclosure
- for double doors
- Long life
- High level of contact reliability with low voltages and currents
- 2 cable entries M20
- Ball latch for each door, individually adjustable up to 400 N
- Spring-loaded actuators

Technical data

<table>
<thead>
<tr>
<th>Standards</th>
<th>IEC/EN 60947-5-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure</td>
<td>light-alloy diecast, paint finish</td>
</tr>
<tr>
<td>Actuator</td>
<td>zinc-plated brass/aluminum</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP67 to EN 60529</td>
</tr>
<tr>
<td>Contact material</td>
<td>silver</td>
</tr>
<tr>
<td>Contact type</td>
<td>change-over contact with double break, type Zb, with galvanically separated contact bridges</td>
</tr>
<tr>
<td>Switching principle</td>
<td>IEC 60947-5-1 slow action, NC contact with positive break</td>
</tr>
<tr>
<td>Connection</td>
<td>screw terminals</td>
</tr>
<tr>
<td>Cable section</td>
<td>max. 1.5 mm², min. 0.75 mm² (incl. conductor ferrules)</td>
</tr>
<tr>
<td>Cable entry</td>
<td>2 x M20</td>
</tr>
<tr>
<td>Uimp:</td>
<td>4 kV</td>
</tr>
<tr>
<td>U:</td>
<td>250 V</td>
</tr>
<tr>
<td>Iimp:</td>
<td>6 A</td>
</tr>
<tr>
<td>Utilization category</td>
<td>AC-15; DC-13</td>
</tr>
<tr>
<td>I/U:</td>
<td>4 A / 230 VAC</td>
</tr>
<tr>
<td>Max. fuse rating</td>
<td>6 A gG D-fuse</td>
</tr>
<tr>
<td>Positive break travel</td>
<td>5.5 mm</td>
</tr>
<tr>
<td>Positive break force</td>
<td>min. 15 N</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-25 °C … +80 °C</td>
</tr>
<tr>
<td>Mechanical life</td>
<td>&gt; 1 million operations</td>
</tr>
<tr>
<td>Latching force</td>
<td>30 … 400 N (adjustable)</td>
</tr>
</tbody>
</table>

Contact variants

3 NO
3 NC

Contact symbols shown for the closed condition of the guard device.

Note

Actuators must be ordered separately (refer to page 1-24).

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>①</td>
<td>1637</td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

Approvals

Note

Contact symbols shown for the closed condition of the guard device.
Safety switch with separate actuator

### System components

<table>
<thead>
<tr>
<th>Straight actuator AZ/AZM 415-B1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexible actuator AZ/AZM 415-B2</td>
</tr>
<tr>
<td>Flexible actuator AZ/AZM 415-B3</td>
</tr>
<tr>
<td>Lockout tag SZ 415-22-1/-2</td>
</tr>
</tbody>
</table>

### Ordering details

- **Straight actuator**: AZ/AZM 415-B1
- **Flexible actuator**: AZ/AZM 415-B2 and AZ/AZM 415-B3
- **Lockout tag**: SZ 415-22-1/-2

**Safety door-handle system STS**

Actuator with handle and without or with emergency handle and inclusive mounting plate: AZ 415-STS30

(A detailed product description can be found on page 1-25)
Safety switch with separate actuator

**AZ 415-STS30-...**

### System variants

- **AZ 415-STS30-01**
- **AZ 415-STS30-02**
- **AZ 415-STS30-03**
- **AZ 415-STS30-04**
- **AZ 415-STS30-05**
- **AZ 415-STS30-06**
- **AZ 415-STS30-07**
- **AZ 415-STS30-08**

![AZ 415 STS30-02/04/05/07](image)

The drawings are always shown with a view to the switch.

### System components

- **Lockout tag**
  - **SZ 415-1/2**
- **Lockout tag with 5 circular holes**
  - **SZ 415-1-2477**
  - **SZ AZ 415-1-2477**
- **Lockout tag with 7 circular holes**
  - **SZ 415-2-2477**
  - **SZ AZ 415-2-2477**

- **Centering device**
  - **TF.**
- **Mounting plate**
  - **MP TG-01**

### Ordering details

**Included in delivery**
- Mounting plate for safety switch
- Actuator incl. mounting plate
- Emergency handle (for variant -05 and -06 incl. mounting plate)

**Ordering example**
To order, first choose the desired safety switch and then the door handle system: for example AZ 415-1/12ZPK and AZ 415-STS30-05

**Ordering details**

- **Mounting inside**
  - with emergency handle
    - door hinge right: **AZ 415-STS30-01**
    - door hinge left: **AZ 415-STS30-02**
  - without emergency handle
    - door hinge right: **AZ 415-STS30-03**
    - door hinge left: **AZ 415-STS30-04**

- **Mounting outside**
  - with emergency handle
    - door hinge right: **AZ 415-STS30-05**
    - door hinge left: **AZ 415-STS30-06**
  - without emergency handle
    - door hinge right: **AZ 415-STS30-07**
    - door hinge left: **AZ 415-STS30-08**

**Ordering details**

- **Mounting inside**
  - **TFA-010**
- **Mounting outside**
  - **TFI-010**

(Product information see page 1-52)

- **Mounting plate**
  - **MP TG-01**
Further products and program extensions for guard door monitoring

SHGV cablefree guard door monitoring system

The SHGV trapped key system conforms to EN 1088 and is particularly suitable for the monitoring of maintenance and service doors. The trapped key system consists of a keyed selector switch for the control panel and a mechanical interlock switch for the guard door which use the same lock key. This system eliminates wiring or cabling between the guard and the control cabinet.

Further info can be found in the online product catalog.

SVE key operated selector switch interlocking device

For use with the SHGV system in applications where hazardous movement may run longer than the time to reach the area and transfer the key. Used instead of the SHGV/ESS keyed selector switch. The SVE allows up to three keys to power off the machine, but uses a solenoid to keep the keys trapped for the duration of machine rundown.

Further info can be found in the online product catalog.

SVM multiple key distribution station

For use with SHGV System. The selector switch key is used to free either 6 or 10 additional keys for multiple SHGV switch units. The selector switch key is trapped until all additional keys have been returned. Available in a surface mounted aluminum housing or on a stainless steel plate for flush mounting.

Further info can be found in the online product catalog.
Safe switching and monitoring
Solenoid Interlocks

Solenoid locking switches are used on sliding, hinged and removable guard doors that must be closed and locked for operator safety. It is a two part system consisting of a switch body, mounted to the guard frame, and a separate actuator key, mounted to the door.

Models are available in several mounting profiles and housing materials. Each model has a variety of actuator key options: straight, right angle mounting, floating head, and keys integrated into door handle assemblies.

<table>
<thead>
<tr>
<th>Thermoplastic housing</th>
<th>1-28</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZM170</td>
<td>1-28</td>
</tr>
<tr>
<td>AZM161</td>
<td>1-36</td>
</tr>
<tr>
<td>TZM/TZF</td>
<td>1-42</td>
</tr>
<tr>
<td>AZM190 (TZKF/TZKM)</td>
<td>1-44</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Metal housings</th>
<th>1-46</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZM415</td>
<td>1-46</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Door handle actuators</th>
<th>1-53</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZM170-B25</td>
<td>1-35</td>
</tr>
<tr>
<td>AZM161-STS30</td>
<td>1-41</td>
</tr>
<tr>
<td>AZM415-STS30</td>
<td>1-51</td>
</tr>
</tbody>
</table>

Electronic Solenoid locking switches 1-53
Solenoid interlocks

AZM 170 cut clamps

• Cut clamps
  • Interlock with protection against incorrect locking
  • Thermoplastic enclosure
  • Compact design
  • Manual release
  • Long life
  • Double insulated
  • High holding force 1,000 N
  • Power to unlock/power to lock principle
  • 1 cable entry M20 cord grip

AZM 170 with connector

• Connector
  • Interlock with protection against incorrect locking
  • Thermoplastic enclosure
  • Compact design
  • Manual release
  • Long life
  • Double insulated
  • High holding force 1,000 N
  • Power to unlock/power to lock principle

AZM 170 screw terminals

• Screw terminals
  • Interlock with protection against incorrect locking
  • Thermoplastic enclosure
  • Compact design
  • Manual release
  • Long life
  • Double insulated
  • High holding force 1,000 N
  • Power to unlock/power to lock principle
  • 1 cable entry M20 cord grip

Approvals

Ordering details

<table>
<thead>
<tr>
<th>AZM 170</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>Cut clamp</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Screw terminals</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Latching force 5 N</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Latching force 30 N</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Power to unlock</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Power to lock</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Cable gland</td>
</tr>
<tr>
<td></td>
<td>ST</td>
<td>Connector M12</td>
</tr>
<tr>
<td></td>
<td>ST-2431</td>
<td>Connector M12, with individual solenoid monitoring</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AZM 170</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8</td>
<td>Manual release</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Manual release from side</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Gold-plated contacts</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>24VAC/DC</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>110VAC</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>230VAC</td>
</tr>
</tbody>
</table>

Note

Manual release (left)
• Included on standard version
• For manual release using M5 triangular key,
  Manual release from side (right)
• Additional manual release on side, ordering suffix -2197
• Only available for power to unlock principle
Solenoid interlocks

Technical data

Standards: IEC/EN 60947-5-1, EN ISO 13849-1, BG-GS-ET-19
Enclosure: glass fiber reinforced thermoplastic, self-extinguishing
Actuator and locking bolt: stainless steel 1.4301
Protection class: IP67 to EN 60529
Contact material: silver
Contact type: change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
Switching principle: IEC 60947-5-1 slow action, NC contacts with positive break
Cable type: flexible with insulated conductor ferrules
Cable section:
- cut clamp terminals: 0.75 ... 1.0 mm²
- screw terminals: 0.25 ... 1.5 mm²
Uimp: 4 kV
U: 250 V
Iimp: 6 A
Utilization category: AC-15, DC-13
Ie/U: 4 A / 230 VAC
Max. fuse rating: 6 A gG D-fuse
Positive break travel: 11 mm
Positive break force: 8.5 N for each NC contact fitted
Magnet: 100% ED
Us: 24 VAC/DC
110 VAC, 50/60 Hz
230 VAC, 50/60 Hz
Power consumption: max. 10 W
Ambient temperature: -25 °C ... +60 °C
Mechanical life: > 1 million operations
Fmax: 1,000 N
Latching force: 30 N for ordering suffix R
Actuating speed: max. 2 m/s

Classification:
Standards: EN ISO 13849-1
Btot (NC): 2,000,000
Mission time: 20 years

MTTFd = \frac{B_{tot}}{0.1 \times n_{op}} \cdot \frac{d_{op} \times h_{op} \times 3600 \, \text{s/h}}{t_{cycle}}

Note

The contact 21-32 is actuated when A1-A2 is energized or de-energized.

At least one magnetic contact with positive break must be integrated in the safety circuit.

Circuit diagrams show de-energized condition with actuator inserted.

Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

Contact variants

Power to unlock
1 NO / 1 NC
2 NC

Connector
1 NO / 1 NC
2 NC

Note

Actuators and connector plugs must be ordered separately. (refer to page 1-34)
Solenoid interlocks

AZM 170SK-../..

- Screw terminals
- Interlock with protection against incorrect locking.
- Thermoplastic enclosure
- Compact design
- Manual release from side
- Long life
- Double-insulated
- High holding force 1,000 N
- With latching force 30 N or 5 N
- Power to unlock / power to lock principle
- 1 cable entry M20 cord grip
- EX version available

Technical data

Standards: IEC/EN 60947-5-1
EN ISO 13849-1
BG-GS-ET-19
Enclosure: glass fiber reinforced thermoplastic, self-extinguishing
Actuator and locking bolt: stainless steel 1.4301
Protection class: IP67 to EN 60529
Contact material: silver
Contact type: change-over contact with double break, type Zb with galvanically separated contact bridges
Switching principle: > IEC 60947-5-1 slow action, NC contacts with positive break
Cable gland: M20
Connection: screw terminals
Cable type: flexible with insulated conductor ferrules
Cable section: min. 0.25 mm² max. 1.5 mm² (incl. conductor ferrules)

- Power to unlock
  1 NO 2 NC
  (Ordering suffix -12/00)

- Power to lock
  + 1 NO 1 NC
  1 NO 1 NC / 2 NC
  2 NO 1 NC / 2 NC
  2 NO 2 NC

- Latching force 5 N
- Latching force 30 N
- Power to unlock
- Power to lock
- Gold-plated contacts
- Manual release for power to unlock principle

Contact variants

Power to unlock

1 NO 2 NC
(Ordering suffix -10/02)

2 NC / 1 NO
(Ordering suffix -02/10)

Note

Manual release from side
- For manual release using M5 triangular key, available as accessory
- Manual release available for power to unlock principle
- Ordering suffix -2197

Note

Circuit diagrams show de-energized condition with actuator inserted.

At least one magnetic contact with positive break must be integrated in the safety circuit.
**Solenoid interlocks**

**Contact variants**

**Power to unlock**

1 NO 1 NC / 1 NO 1 NC  
(Ordering suffix -11/11)

![Diagram](image1)

1 NO 1 NC / 2 NC  
(Ordering suffix -11/02)

![Diagram](image2)

2 NC / 1 NO  
(Ordering suffix -02/10)

![Diagram](image3)

**Power to lock**

1 NO 2 NC  
(Ordering suffix -12/00)

![Diagram](image4)

2 NC / 1 NC  
(Ordering suffix -02/01)

![Diagram](image5)

**Power to unlock**

1 NO 1 NC / 1 NO 1 NC  
(Ordering suffix -11/11)

![Diagram](image6)

1 NO 1 NC / 2 NC  
(Ordering suffix -11/02)

![Diagram](image7)

2 NC / 1 NO  
(Ordering suffix -02/10)

![Diagram](image8)

---

**Note**

Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

**Actuators must be ordered separately.**
(refer to page 1-34)
Solenoid interlocks

AZM 170ST-..../..

- Plug-in connector
- Interlock with protection against incorrect locking.
- Thermoplastic enclosure
- Compact design
- Manual release from side
- Long life
- Double-insulated [ ]
- High holding force 1,000 N
- With latching force 30 N or 5 N
- Power to unlock / power to lock principle
- Plug-in connector can be rotated
- Plug-in connectors required: 4- and 8-poles
- EX version available

Technical data

Standards:
- IEC/EN 60947-5-1
- EN ISO 13849-1
- BG-GS-ET-19

Enclosure:
- glass fiber reinforced thermoplastic, self-extinguishing

Actuator and locking bolt:
- stainless steel 1.4301

Protection class:
- IP67 to EN 60529

Contact material:
- silver

Contact type:
- change-over contact with double break, type Zb with galvanically separated contact bridges

Switching principle:
- IEC 60947-5-1 slow action, NC contacts with positive break

Connection:
- connector
- $U_{imp}$: 0.8 kV
- $U_2$: 60 V
- $I_{imp}$: 2 A

Utilization category:
- DC-13

Max. fuse rating:
- 2 A / 24 VDC

Positive break travel:
- 11 mm

Positive break force:
- 8.5 N for each NC contact fitted

Magnet:
- 100% ED

$U_1$: 24 VDC

Power consumption:
- max. 10 W

Ambient temperature:
- -25 °C … +60 °C

Mechanical life:
- > 1 million operations

$F_{\text{max}}$: 1,000 N

Latching force:
- 30 N for ordering suffix R

Actuating speed:
- max. 2 m/s

Classification:
- Standards: EN ISO 13849-1
- $B_{\text{so}}$ (NC): 2,000,000
- Mission time: 20 years

$\text{MTTF}_B = \frac{B_{\text{so}}}{0.1 \times n_{\text{so}}}$

$\text{n}_{\text{so}} = \frac{d_{\text{so}} \times h_{\text{so}} \times 3600 \text{ s/h}}{t_{\text{op}}}$

Approvals

* under preparation

Ordering details

AZM 170ST-..../..-K-3-0-024

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>12/11</td>
<td>1 NO 2 NC / 1 NO 1 NC</td>
</tr>
<tr>
<td></td>
<td>12/02</td>
<td>1 NO 2 NC / 2 NC</td>
</tr>
<tr>
<td></td>
<td>11/11</td>
<td>1 NO 1 NC / 1 NO 1 NC</td>
</tr>
<tr>
<td></td>
<td>11/02</td>
<td>1 NO 1 NC / 2 NC</td>
</tr>
<tr>
<td>②</td>
<td>R</td>
<td>Latching force 5 N</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>Power to unlock</td>
</tr>
<tr>
<td>③</td>
<td>1637</td>
<td>Gold-plated contacts</td>
</tr>
<tr>
<td>④</td>
<td>2197</td>
<td>Manual release for power to unlock principle</td>
</tr>
</tbody>
</table>

Note

Manual release from side
- For manual release using M5 triangular key, available as accessory
- Manual release available for power to unlock principle
- Ordering suffix -2197

Contact variants

Power to unlock

1 NO 2 NC / 2 NC
(Ordering suffix -12/02)

Actuators and connector plugs must be ordered separately. (refer to page 1-34)

Note

Connector M12
4-pole
8-pole

Actuators and connector plugs must be ordered separately. (refer to page 1-34)
Solenoid interlocks

Contact variants

Power to unlock
1 NO 1 NC / 1 NO 1 NC
(Ordering suffix -11/11)

![Circuit diagram for Power to unlock 1 NO 1 NC / 1 NO 1 NC](image)

Power to lock
1 NO 2 NC / 2 NC
(Ordering suffix -12/02)

![Circuit diagram for Power to lock 1 NO 2 NC / 2 NC](image)

Power to lock
1 NO 1 NC / 1 NO 1 NC
(Ordering suffix -11/11)

![Circuit diagram for Power to lock 1 NO 1 NC / 1 NO 1 NC](image)

Contact variants

1 NO 1 NC / 2 NC
(Ordering suffix -11/02)

![Circuit diagram for 1 NO 1 NC / 2 NC](image)

1 NO 2 NC / 1 NO 1 NC
(Ordering suffix -12/11)

![Circuit diagram for 1 NO 2 NC / 1 NO 1 NC](image)

1 NO 1 NC / 2 NC
(Ordering suffix -11/02)

![Circuit diagram for 1 NO 1 NC / 2 NC](image)

Note

Circuit diagrams show de-energized condition with actuator inserted.

At least one magnetic contact with positive break must be integrated in the safety circuit.

Note

Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.
Solenoid interlocks

System components

<table>
<thead>
<tr>
<th>Component</th>
<th>Drawing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight actuator AZ 17/170-B1</td>
<td><img src="image1" alt="Straight actuator AZ 17/170-B1" /></td>
</tr>
<tr>
<td>Long straight actuator AZ 17/170-B11</td>
<td><img src="image2" alt="Long straight actuator AZ 17/170-B11" /></td>
</tr>
<tr>
<td>Angled actuator AZ 17/170-B5</td>
<td><img src="image3" alt="Angled actuator AZ 17/170-B5" /></td>
</tr>
<tr>
<td>Flexible actuator AZM 170-B6</td>
<td><img src="image4" alt="Flexible actuator AZM 170-B6" /></td>
</tr>
<tr>
<td>Mounting set MS AZM 170</td>
<td><img src="image5" alt="Mounting set MS AZM 170" /></td>
</tr>
<tr>
<td>Connector plug</td>
<td><img src="image6" alt="Connector plug" /></td>
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</tbody>
</table>

Ordering details

<table>
<thead>
<tr>
<th>Component</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight actuator with rubber mounting</td>
<td>AZ 17/170-B1-2245</td>
</tr>
<tr>
<td>Angled actuator</td>
<td>AZ 17/170-B5</td>
</tr>
<tr>
<td>Flexible actuator</td>
<td>AZM 170-B6</td>
</tr>
<tr>
<td>Long straight actuator</td>
<td>AZ 17/170-B11</td>
</tr>
<tr>
<td>Long angled actuator</td>
<td>AZ 17/170-B15</td>
</tr>
<tr>
<td>Centering guide</td>
<td>AZM 170-B</td>
</tr>
<tr>
<td>Centering device</td>
<td>TFA-020, TFI-020</td>
</tr>
<tr>
<td>Connector plug M12</td>
<td>MS AZM 170 P</td>
</tr>
<tr>
<td>Mounting sets</td>
<td>MS AZM 170 R/P</td>
</tr>
<tr>
<td>Without cable, 4-poles</td>
<td>101209950</td>
</tr>
<tr>
<td>With 5m cable, 4-poles</td>
<td>101208523</td>
</tr>
<tr>
<td>Without cable, 8-poles</td>
<td>103011412</td>
</tr>
<tr>
<td>Without cable, 4-poles, B-code</td>
<td>101209976</td>
</tr>
<tr>
<td>With 5m cable, 4-poles, B-code</td>
<td>101209938</td>
</tr>
<tr>
<td>Tamperproof screws with unidirectional slots</td>
<td>101147463</td>
</tr>
</tbody>
</table>

(Product information see page 1-52)
Solenoid interlocks

**Actuator AZM 170-B25**

- Door-handle actuator for solenoid interlocks AZM 170-…ZRK (latching)
- Ergonomic operation
- No supplementary door-handle required
- No protruding actuator
- Simple mounting
- Several door-handles available
- Possibility to mount the own handles using a default square screw (8 mm)
- Mounting plate for fitting to standard profiles optionally available

**System components**

- Mounting plate
- Star grip
- T-grip

**Ordering details**

<table>
<thead>
<tr>
<th>AZM 170-B25-➀-➁</th>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>➀ L</td>
<td>Door hinge left</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Door hinge right (View directed towards the inside of the hazardous area)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>➁ G0</td>
<td>Actuator without handle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G1</td>
<td>Star grip</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G2</td>
<td>T-grip</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Ordering details**

- Mounting plate
- MP AZ 17/170-B25
- Star grip G1
- T-grip G2

**Note**

The safety switch or solenoid interlock is not included in delivery and must be ordered separately.

Please note that you need a device with latching (R).

The technical data of the AZM 170-…ZRK solenoid interlock can be found in the main catalog page 1-28 or in the online catalog at www.usa.schmersal.net

**Approvals**

![CE](image_url)
Solenoid interlocks

AZM 161

- Interlock with protection against incorrect locking
- Thermoplastic enclosure
- 6 contacts
- Manual release, emergency exit or emergency release
- Long life
- Double insulated
- High holding force 2,000 N
- Large wiring compartment
- Power to unlock/power to lock principle
- Screw terminals or cage clamps or connector
- 4 cable entries M16
- EX version available
- AS-Interface Safety at Work available

Approvals

Ordering details

AZM 161 ①-②③④⑤-⑥-⑦

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
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<tbody>
<tr>
<td>①</td>
<td>CC</td>
<td>Cage clamp</td>
</tr>
<tr>
<td></td>
<td>SK</td>
<td>Screw terminals</td>
</tr>
<tr>
<td></td>
<td>ST</td>
<td>Connector M12</td>
</tr>
<tr>
<td>②</td>
<td>11/03</td>
<td>1NO/4NC with connector</td>
</tr>
<tr>
<td>①</td>
<td>11/12</td>
<td>2NO/3NC with connector</td>
</tr>
<tr>
<td></td>
<td>12/03</td>
<td>1NO/5NC</td>
</tr>
<tr>
<td></td>
<td>12/11</td>
<td>2NO/3NC with connector</td>
</tr>
<tr>
<td></td>
<td>12/12</td>
<td>2NO/4NC</td>
</tr>
<tr>
<td>③</td>
<td>R</td>
<td>Latching force 5 N</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>Power to unlock</td>
</tr>
</tbody>
</table>

Technical data

Standards: IEC/EN 60947-5-1; EN ISO 13849-1; EN 1088; BG-GS-ET-19
Enclosure: glass fiber reinforced thermoplastic; self-extinguishing
Actuator and locking bolt: stainless steel 1.4301
Protection class: IP67 to EN 60529
Contact material: silver
Contact type: change-over contact with double break, type Zb, with galvanically separated contact bridges
Switching principle: slow action, NC contacts with positive break
Connection: screw terminals or cage clamps or connector
Cable type: flexible
Cable section: min. 0.25 mm² max. 1.5 mm² (incl. conductor ferrules)
Cable entry: 4 x M16

U_{i}: - screw terminals or cage clamps: 4 kV
- connector, 4-pole: 2.5 kV
- connector, 8-pole: 0.8 kV

I_{\text{max}}: - screw terminals or cage clamps, connector, 4-pole: 250 V
- connector, 8-pole: 80 V

I_{\text{max}}: - screw terminals or cage clamps: 6 A
- connector, 4-pole: 4 A
- connector, 8-pole: 2 A

Utilization category: AC-15, DC-13

Ordering details

AZM 161 ①-②③④⑤-⑥-⑦

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
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<tr>
<td>⑧</td>
<td>ED</td>
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</tr>
<tr>
<td></td>
<td>EU</td>
<td>at the rear</td>
</tr>
<tr>
<td></td>
<td>T</td>
<td>Emergency exit lateral</td>
</tr>
<tr>
<td></td>
<td>TD</td>
<td>on cover-side</td>
</tr>
<tr>
<td></td>
<td>TU</td>
<td>at the rear</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>Emergency release</td>
</tr>
<tr>
<td>⑧</td>
<td>024</td>
<td>( U_{\text{N}} ) 24 VAC/DC</td>
</tr>
<tr>
<td></td>
<td>110/230</td>
<td>( U_{\text{N}} ) 110/230 VAC</td>
</tr>
</tbody>
</table>

* only available in 24V AC/DC models

Approvals

Ordering details

AZM 161 ①-②③④⑤-⑥-⑦

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
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<tr>
<td>⑧</td>
<td>ED</td>
<td>Manual release lateral on cover-side</td>
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<tr>
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<td>EU</td>
<td>at the rear</td>
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<tr>
<td></td>
<td>T</td>
<td>Emergency exit lateral</td>
</tr>
<tr>
<td></td>
<td>TD</td>
<td>on cover-side</td>
</tr>
<tr>
<td></td>
<td>TU</td>
<td>at the rear</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>Emergency release</td>
</tr>
<tr>
<td>⑧</td>
<td>024</td>
<td>( U_{\text{N}} ) 24 VAC/DC</td>
</tr>
<tr>
<td></td>
<td>110/230</td>
<td>( U_{\text{N}} ) 110/230 VAC</td>
</tr>
</tbody>
</table>

* only available in 24V AC/DC models

Actuators ordered separately (refer to page 1-39)

Note: 24V AC/DC models available with integrated LED. Add suffix G
Solenoid interlocks

**Contact variants**

**Power to unlock**

**Power to lock**

2 NO / 4 NC (12/12)

1 NO / 5 NC (12/03)

**Connector**

2 NO / 3 NC (12/11)

1 NO / 4 NC (12/12)

**Connector**

2 NO / 3 NC (11/12)

1 NO / 5 NC (12/03)

**Legend**

14 safety guard open / LED on
+
+24 VDC

1 0 VDC

64 unlocked / LED on

**Note**

At least one magnetic contact with positive break must be integrated in the safety circuit.

Contact variants show de-energized condition with actuator inserted.

**Note**

Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

**Note**

The contacts with LED are shown in closed and locked condition.
Solenoid interlocks

AZM 161..-12/12...

- Manual release
  - For manual release using M5 triangular key, available as accessory
  - For maintenance, setting-up, etc.

AZM 161..-12/12...E.

- Manual release
  - For manual release using M5 triangular key, available as accessory
  - For maintenance, setting-up, etc.
  - Cover-side fitting (ordering suffix ED) or rear fitting (ordering suffix EU) enabled

AZM 161..-12/12...T.

- Emergency exit
  - The emergency exit is used if an already locked dangerous area needs to be evacuated
  - Emergency exit by pressing the red push-button
  - Reset by pulling on the red push-button
  - Cover-side fitting (ordering suffix TD) or rear fitting (ordering suffix TU) enabled

AZM 161..-12/12...N

- Emergency release
  - For cases of danger
  - Mounting only outside the guarded area

Note

Combining the manual release and the emergency exit in different mounting directions is only possible with the following combination: ED/TU and TD/EU
## Solenoid interlocks

### System components

<table>
<thead>
<tr>
<th>Straight actuator B1</th>
<th>Actuator with magnetic latch B1-1747</th>
<th>Actuator with centering guide B6-2177</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight actuator B1E</td>
<td>Actuator with slot lip-seal B1-2024</td>
<td>Shortened straight actuator B1S</td>
</tr>
<tr>
<td>Straight actuator B1F</td>
<td>Actuator with ball latch B1-2053</td>
<td>Shortened straight actuator B1ES</td>
</tr>
<tr>
<td>Flexible actuator B6</td>
<td>Actuator with centering guide B1-2177</td>
<td>Shortened angled actuator B6S</td>
</tr>
</tbody>
</table>

### Ordering details

<table>
<thead>
<tr>
<th>Straight actuator</th>
<th>AZM 161-B1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight actuator</td>
<td>AZM 161-B1E</td>
</tr>
<tr>
<td>Straight actuator</td>
<td>AZM 161-B1F</td>
</tr>
<tr>
<td>Flexible actuator</td>
<td>AZM 161-B6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Straight actuator with magnetic latch</th>
<th>AZM 161-B1-1747</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight actuator with slot lip-seal</td>
<td>AZM 161-B1-2024</td>
</tr>
<tr>
<td>Straight actuator with ball latch</td>
<td>AZM 161-B1-2053</td>
</tr>
<tr>
<td>Straight actuator with centering guide</td>
<td>AZM 161-B1-2177</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flexible actuator with centering guide</th>
<th>AZM 161-B6-2177</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shortened straight actuator B1S</td>
<td>AZM 161-B1S</td>
</tr>
<tr>
<td>Shortened straight actuator B1ES</td>
<td>AZM 161-B1ES</td>
</tr>
<tr>
<td>Shortened angled actuator B6S</td>
<td>AZM 161-B6S</td>
</tr>
</tbody>
</table>
Solenoid interlocks

**System components**

- Lockout tag SZ 415-1/-2
- Slot sealing plug AZM 161
- Triangular key AZM KEY
- Connector plug

**Ordering details**

- Lockout tag
  - for …STS30-01/-03/-06/-08: SZ 415-1
  - for …STS30-02/-04/-05/-07: SZ 415-2
- Lockout tag with 5 circular holes
  - for …STS30-01/-03/-06/-08: SZ 415-1-2477
  - for …STS30-02/-04/-05/-07: SZ 415-2-2477
- Centering device only for AZ 16-ST30…
  - and AZM 161-ST30…: TFA-020
  - Mounting outside: MP TG-01
- Mounting sets
  - MS AZM 161 P
  - MS AZM 161 R/P
- Slot sealing plug AZM 161
- Triangular key AZM KEY
- Connector plugs on request
- (with 8-pole connector only)
  - 24 VAC/DC variant possible!
- Tamperproof screws with unidirectional slots (without drawing)
  - M5 x 12: 101135338
  - M5 x 16: 101135339
  - M5 x 20: 101135340
  - (Quantity 2 pcs)

For more information, see our online product catalog: www.usa.schmersal.net
Solenoid interlocks

**AZM 161-STS30-...**

**Mounting right-angled**

**System variants**

- **AZM 161-STS30-01**
- **AZM 161-STS30-02**
- **AZM 161-STS30-03**
- **AZM 161-STS30-04**
- **AZM 161-STS30-05**
- **AZM 161-STS30-06**
- **AZM 161-STS30-07**
- **AZM 161-STS30-08**

The drawings are always shown with a view to the switch.

**Note**

**Included in delivery**
- Mounting plate for safety switch
- Actuator incl. mounting plate
- Emergency handle (for variant -05 and -06 incl. mounting plate)

**Ordering example**
To order, first choose the desired safety switch and then the door handle system: for example AZM SK-12/12RK-T-024 and AZM 161-STS30-01

**Ordering details**

Mounting right-angled to safety guard (only STS30-01, -02, -07, -08)

**Ordering suffix -R**

- Mounting inside with emergency handle
  - Door hinge right: AZM 161-STS30-01
  - Door hinge left: AZM 161-STS30-02

- Mounting inside without emergency handle
  - Door hinge right: AZM 161-STS30-03
  - Door hinge left: AZM 161-STS30-04

- Mounting outside with emergency handle
  - Door hinge right: AZM 161-STS30-05*
  - Door hinge left: AZM 161-STS30-06*

- Mounting outside without emergency handle
  - Door hinge right: AZM 161-STS30-07
  - Door hinge left: AZM 161-STS30-08

(*) only for power to lock
Solenoid interlocks

**TZM/TZF**

- Interlock with protection against incorrect locking
- Thermoplastic enclosure
- Manual release, emergency exit or emergency release
- Long life
- Double insulated
- Holding force 1500 N
- Power to unlock/power to lock principle
- 1 cable entry M20
- Actuating play 11 mm in direction of actuation
- With LED on request

### Technical data

- **Standards:** IEC/EN 60947-5-1
- **Enclosure:** glass fiber reinforced thermoplastic, self-extinguishing
- **Actuator and locking bolt:** zinc-plated steel / zinc diecast
- **Protection class:** IP67; Ordering suffix NF: IP65
- **Contact material:** silver
- **Contact type:** change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
- **Switching principle:** IEC 60947-5-1, slow action,
  - NC contact with positive break
- **Connection:** self-opening screw terminals
- **Cable entry:** M20
- **Cable section:** max. 2.5 mm² (incl. conductor ferrules)
- **Utilization category:** slow action, NC contact with positive break
- **Power supply:** AC-15, DC-13
- **Connection:** self-opening screw terminals
- **Cable section:** max. 2.5 mm² (incl. conductor ferrules)
- **Cable entry:** M20
- **Uimp:** 2.5 kV
- **Ui:** 320 V
- **Ithe:** 4 A
- **Ue:** 24 VDC
- **Fmax:** 1,500 N
- **Latching force:** 20 N
- **Magnet:** 100% ED
- **Us:** 24 VDC
- **Power consumption:** max. 8.5 W
- **Ambient temperature:** 0 °C … + 50 ºC
- **Mechanical life:** 1 million operations
- **Fmax:** 1,500 N
- **Latching force:** 20 N

### Contact variants

- **Magnet-operated**
  - 2 NC in series / 1 NO
- **Spring-operated**
  - 2 NC in series / 1 NO

### Approvals

![UL, CE]

### Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F</td>
<td>Spring-operated</td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>Magnet-operated</td>
</tr>
<tr>
<td>3</td>
<td>W</td>
<td>2 NC in series / 1 NO</td>
</tr>
<tr>
<td>4</td>
<td>CW*</td>
<td>2 NC / 2 NO</td>
</tr>
<tr>
<td>5</td>
<td>S</td>
<td>Manual release</td>
</tr>
<tr>
<td>6</td>
<td>N</td>
<td>Emergency release</td>
</tr>
<tr>
<td>7</td>
<td>NF</td>
<td>Emergency exit and manual release</td>
</tr>
<tr>
<td>8</td>
<td>24VDC</td>
<td>24 VDC</td>
</tr>
<tr>
<td>9</td>
<td>110VAC</td>
<td>110 VAC</td>
</tr>
<tr>
<td>10</td>
<td>230VAC</td>
<td>230 VAC</td>
</tr>
</tbody>
</table>

* available in 24VDC only

### Note

- **Manual release (left)**
  - For manual unlocking using triangular key TZ-69 (included in delivery)
  - For maintenance, setting-up, etc.
- **Emergency release (middle)**
  - For cases of danger
  - Mounting only outside the guarded area
- **Emergency exit (right)**
  - For cases of danger
  - Actuation from within the hazardous area

Contact 21-22 must be integrated in the safety circuit. Contact symbols shown for the closed condition of the guard device.

Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

For the version with LED, the monitoring contacts are not potential-free

The actuator TZ/CO is included in delivery.

Other contacts variants on request
Solenoid interlocks

System components

Straight actuator TZ/CO

Flexible actuator TZ/COF/HIS.1

Shortened straight actuator TZ/CK

Angled actuator TZ/CW

Flexible actuator TZ/COF/HIS.2

Shortened angled actuator TZ/CWK

Straight radius actuator TZ/COR

Flexible actuator TZ/CORF/HIS.1

Mounting plate TZ-44

Angled radius actuator TZ/CWR

Flexible actuator TZ/CORF/HIS.2

Angled triangular key TZ-75

Ordering details

Straight actuator TZ/CO

Flexible actuator TZ/COF/HIS.1

Shortened straight actuator TZ/CK

Angled actuator TZ/CW

Flexible actuator TZ/COF/HIS.2

Shortened angled actuator TZ/CWK

Straight radius actuator TZ/COR

Flexible actuator TZ/CORF/HIS.1

Mounting plate TZ-44

Angled radius actuator TZ/CWR

Flexible actuator TZ/CORF/HIS.2

Angled triangular key TZ-75

Ordering details

Shortened straight actuator TZ/CK

Shortened angled actuator TZ/CWK

Mounting plate TZ-44

Triangular key, angled TZ-75

(TZ-69 triangular key is included in delivery for S and N executions)

Centering device
Mounting outside TFA-020
Mounting inside TFI-020
(Product information see page 1-52)
Solenoid interlocks

**AZM 190 (TZKF/TZKM)**

- Interlock with protection against incorrect locking
- Thermoplastic enclosure
- Manual or Emergency release
- Long life
- Power to unlock/power to lock principle
- Slim design, particularly suitable for fitting on hinged doors, aluminum profiles and fencing
- Actuating head can be repositioned by 4 x 90°
- Sealing mechanism to prevent the ingress of dirt
- 2 cable entries M20
- Wiring compartment
- Holding force 1950 N

**Technical data**

- Standards: IEC/EN 60947-5-1
- Enclosure: glass fiber reinforced thermoplastic
- Actuator and locking bolt: zinc-plated steel / zinc diecast
- Protection class: IP67; Ordering suffix N: IP65
- Contact material: silver
- Contact type: change-over contact, double break, galvanically separated contact bridges
- Switching principle: IEC 60947-5-1 slow action, NC contact with positive break
- Connection: screw terminals, solid or multi-strand lead
- Cable section: min. 0.5 mm², max. 2.5 mm²; incl. conductor ferrules: max. 1.5 mm²
- \( U_{imp} \): 4 kV
- \( U_i \): 250 V
- \( I_{th} \): 4 A
- Utilization category: AC-15, DC-13
- \( I_r/U_i \): 4 A / 230 VAC
- \( I_r/U_i \): 4 A / 24 VDC
- Max. fuse rating: 4 A gG D-fuse (DIN EN 60269-1)
- Positive break travel: 2 x 3.5 mm
- Positive break force: 20 N
- Magnet: 100% ED
- Power consumption: max. 8.5 W
- Actuating speed: max. 20 m/min
- Max. actuating frequency: 1,200 s/h
- Ambient temperature: 0 °C … +50 °C
- Mechanical life: 1 million operations
- \( F_{max} \): 1950 N
- Latching force: 20 N

**Classification**

- Standards: EN ISO 13849-1
- \( B_{10d} \): 2,000,000
- Mission time: 20 years
- \( MTTF_{B} = \frac{B_{10d}}{0,1 \times n_{op}} \times n_{op} = \frac{d_{op} \times n_{op} \times 3600}{t_{cycle}} \)

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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<td>1 NO / 1 NC</td>
<td>Magnet: 1 NC</td>
</tr>
<tr>
<td>11/10</td>
<td>1 NO / 1 NC</td>
<td>Actuator: 1 NC</td>
</tr>
<tr>
<td>02/10</td>
<td>2 NO / 1 NC</td>
<td>1 NO</td>
</tr>
<tr>
<td>02/01</td>
<td>2 NC</td>
<td>1 NO</td>
</tr>
<tr>
<td>02/01</td>
<td>A</td>
<td>Power to unlock</td>
</tr>
<tr>
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<td>N</td>
<td>Power to lock</td>
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<td>02/01</td>
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<td>Manual release</td>
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</tr>
<tr>
<td>24VDC</td>
<td>U</td>
<td>Power to unlock</td>
</tr>
<tr>
<td>24VAC</td>
<td>U</td>
<td>Power to lock</td>
</tr>
<tr>
<td>48VAC</td>
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<td>Manual release</td>
</tr>
<tr>
<td>110VAC</td>
<td>U</td>
<td>Emergency release</td>
</tr>
<tr>
<td>230VAC</td>
<td>U</td>
<td></td>
</tr>
</tbody>
</table>

**Note**

- **Emergency release button** (left), suffix N
  - For cases of danger
  - Mounting only within the guarded area

- **Manual release** (right)
  - For manual release using triangular key TZ-69
  - For maintenance, setting-up, etc.

**Approvals**

- CE

**Other product variants:**

- for safety fences in aluminum profile systems
- actuator with reduced mounting depth
- preferably for inside mounting
- with emergency exit
- 4 monitoring contacts
- for left-hand and right-hand hinged guard doors
- Crosses from TZKF and TZKM part numbers available on request.
Solenoid interlocks

Contact variants

Power to lock

<table>
<thead>
<tr>
<th>11/01</th>
</tr>
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<tbody>
<tr>
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<table>
<thead>
<tr>
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<tbody>
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<table>
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<tbody>
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</thead>
<tbody>
<tr>
<td><img src="image4.png" alt="Diagram" /></td>
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</tbody>
</table>

System components

Straight actuator AZM 190-B1

Flexible actuator AZM 190-B3/15

Actuator to front mounting AZM 190-B5

Mounting plate TZK/APL

Flexible actuator AZM 190-B3/2x15

Axial cable entry

Flexible actuator AZM 190-B3/7,5

Triangular key TZ-75

Ordering details

- Straight actuator to front mounting AZM 190-B1
- AZM 190-B5
- Flexible actuator AZM 190-B3/2x15
- AZM 190-B3/7,5

<table>
<thead>
<tr>
<th>Ordering details</th>
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<tbody>
<tr>
<td>Flexible actuator AZM 190-B3/15</td>
</tr>
<tr>
<td>Mounting plate TZK/APL</td>
</tr>
<tr>
<td>Axial cable entry TZK/PG</td>
</tr>
<tr>
<td>Triangular key TZ-75 101028565 (TZ-69 triangular key is included in delivery)</td>
</tr>
<tr>
<td>Centering device TFA-020</td>
</tr>
<tr>
<td>Mounting outside TFI-020</td>
</tr>
</tbody>
</table>

(Details information see page 1-52)

Note

Contact symbols shown for the closed and de-energized condition of the guard device.

At least one magnetic contact with positive break must be integrated in the safety circuit.

Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

Actuators and connector plugs must be ordered separately.
Solenoid interlocks

AZM 415-../..

- Interlock with protection against incorrect locking
- Metal enclosure
- Two switches in one enclosure
- Problem-free opening of stressed doors by means of bell-crank system
- Robust design
- Long life
- High holding force 3500 N
- Adjustable ball latch to 400 N
- Various manual and emergency releases available
- Power to unlock/power to lock principle
- 2 cable entries M20 or connector M23 (only for 24 VAC/DC)
- EX version available

Technical data

Standards: IEC/EN 60947-5-1
Enclosure: light-alloy die-cast, enamel finish
Actuator and locking bolt: zinc-plated metal / aluminum
Protection class: IP67
Contact material: silver
Contact type: change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
Switching principle: IEC 60947-5-1 slow action, NC contact with positive break
Connection: screw terminals or connector M23
Cable section: min. 0.75 mm² max. 2.5 mm² (incl. conductor ferrules)
U_{i,p}: 4 kV
U_{i}: 250 V
I_{t,nc}: 6 A
Utilization category: AC-15
I_{i}/U_{i}: 4 A / 230 VAC
Max. fuse rating: 6 A gG D-fuse
Positive break travel: 5 mm
Positive break force: min. 15 N (depending on the setting of the ball latch)
Magnet: 100% ED
Power consumption: max. 10 W
Ambient temperature: -25 °C ... +50 °C
Actuating speed: max. 0.2 m/s
Switching frequency: max. 2.000 / h
Mechanical life: > 1 million operations
F_{max}: 3500 N
Holding force: 30 - 400 N (adjustable)

Classification:
- Standards: EN ISO 13849-1
- B_{mol} (NC): 2.000.000
- Mission time: 20 years

MTTFd = \frac{B_{mol}}{0.1 \times n_{op}} n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}

Contact variants

Power to unlock

11/11 2 NC/2 NO
11/02 3 NC/1 NO
11/20 1 NC/3 NO

Ordering details

AZM 415-①②PK③④ ⑤⑥⑦

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>11/11</td>
<td>2 NC / 2 NO</td>
</tr>
<tr>
<td>②</td>
<td>X</td>
<td>Protection class IP54</td>
</tr>
<tr>
<td>③</td>
<td>Z</td>
<td>Protection class IP67</td>
</tr>
<tr>
<td>④</td>
<td>ST</td>
<td>Connector M23 bottom</td>
</tr>
<tr>
<td>⑤</td>
<td>STR</td>
<td>Connector M23 right</td>
</tr>
<tr>
<td>⑥</td>
<td>A</td>
<td>Power to unlock</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>⑧</td>
<td>E</td>
<td>Without manual release</td>
</tr>
<tr>
<td>⑨</td>
<td>E</td>
<td>Manual release</td>
</tr>
<tr>
<td>⑩</td>
<td>F</td>
<td>Manual release using triangular key</td>
</tr>
<tr>
<td>⑪</td>
<td>FE</td>
<td>Manual release using triangular key (secured with locking screw)</td>
</tr>
<tr>
<td>⑫</td>
<td>RS</td>
<td>Manual release with key</td>
</tr>
<tr>
<td>⑬</td>
<td>T *</td>
<td>Emergency exit using latched pushbutton</td>
</tr>
</tbody>
</table>

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>⑬</td>
<td>TE *</td>
<td>Emergency exit + manual release, mounting outside</td>
</tr>
<tr>
<td>⑭</td>
<td>TEI *</td>
<td>Emergency exit + manual release, mounting inside</td>
</tr>
<tr>
<td>⑮</td>
<td>NS</td>
<td>Emergency release using lock button</td>
</tr>
<tr>
<td>⑯</td>
<td>24 VAC/DC</td>
<td>U, 24 VAC/DC</td>
</tr>
<tr>
<td>⑰</td>
<td>110 VAC</td>
<td>U, 110 VAC</td>
</tr>
<tr>
<td>⑱</td>
<td>230 VAC</td>
<td>U, 230 VAC</td>
</tr>
</tbody>
</table>

Gold-plated contacts

* only for power to unlock principle
Solenoid interlocks

Contact variants

Power to unlock
02/11 3 NC/1 NO

Power to lock
11/11 2 NC/2 NO

Power to lock
02/11 3 NC/1 NO

02/02 4 NC

11/02 3 NC/1 NO

02/02 4 NC

02/20 2 NC/2 NO

11/20 1 NC/3 NO

02/20 2 NC/2 NO

Note

Contacts diagrams show de-energized condition with actuator inserted.

The magnetic contacts S1 are actuated when the solenoid A1-A2 is energized or de-energized.

At least one magnetic contact with positive break must be integrated in the safety circuit.

Actuators must be ordered separately (refer to page 1-50).

Note

Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

Note

PIN number of the connectors ST and STR

<table>
<thead>
<tr>
<th>Contacts</th>
<th>11/11</th>
<th>11/02</th>
<th>11/20</th>
<th>02/11</th>
<th>02/02</th>
<th>02/20</th>
</tr>
</thead>
<tbody>
<tr>
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<td>A2</td>
<td>A2</td>
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<td>A2</td>
</tr>
<tr>
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<td>23</td>
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<tr>
<td>11</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>12</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
</tr>
</tbody>
</table>
Solenoid interlocks

**AZM 415-…ZPK E**
- Manual release
  - Manual release by means of M5 triangular key
  - M5 triangular key, available as accessory
  - For maintenance, installation, etc.
  - Only used on units with power to unlock principle

**AZM 415-…ZPK F**
- Manual release
  - Release by means of M5 triangular key
  - M5 triangular key, available as accessory
  - A chain secures the sealing plug against loss
  - Only used on units with power to unlock principle

**AZM 415-…ZPK TE**
- Manual release (cover-side fitting)
  - Release by means of M5 triangular key
  - M5 triangular key, available as accessory
  - Only used on units with power to unlock principle

**AZM 415-…ZPK TEI**
- Manual release
  - Release by means of cylinder lock
  - Resetting can only be carried out by authorized personnel using key
  - In unlocked position the guard device is protected against unintended closing

**AZM 415-…XPK NS**
- Manual release
  - Release by means of cylinder lock
  - Resetting can only be carried out by authorized personnel using key
  - In unlocked position the guard device is protected against unintended closing

**AZM 415-…XPK RS**
- Manual release
  - Release by means of cylinder lock
  - Resetting can only be carried out by authorized personnel using key
  - In unlocked position the guard device is protected against unintended closing

**AZM 415-…XPK TE**
- Manual release
  - Release and resetting using M5 triangular key
  - Emergency exit by pressing the red push button
  - Resetting by pulling on the red latched button
  - In unlocked position the guard device is protected against unintended closing
  - Interlock mounting outside

**AZM 415-…XPK TEI**
- Manual release
  - Release and resetting using M5 triangular key
  - Emergency exit by pressing the red push button
  - Resetting by pulling on the red latched button
  - In unlocked position the guard device is protected against unintended closing
  - Interlock mounting inside

**Note**
The IP protection class depends on the type of release and is indicated by an X or Z in the ordering suffix.

**Example:**
Protection class IP54  AZM 415-11/11XPKNS
Protection class IP67  AZM 415-11/11ZPKF

For more information, see our online product catalog: www.usa.schmersal.net

For more information, see our online product catalog: www.usa.schmersal.net
Solenoid interlocks

**AZM 415 for double doors**

- A: setting screw ball latch
- E: manual release using triangular key

- Interlock with protection against incorrect locking for double doors
- Metal enclosure
- 3 switches in one enclosure
- Robust design
- Long life
- High holding force 2500 N per door
- Ball latch for each door, individually adjustable up to 400 N
- Manual release available
- Power to unlock/power to lock principle
- 2 cable entries M20 or connector M23 (only for 24 VAC/DC)
- Spring-loaded actuators

**Technical data**

- Standards: IEC/EN 60947-5-1
- Enclosure: light-alloy die-cast, enamel finish
- Actuator and locking bolt: zinc-plated metal / aluminum
- Protection class: IP67
- Contact material: silver
- Contact type: change-over contact with double break, type Zb, with galvanically separated contact bridges
- Switching principle: IEC 60947-5-1 slow action, NC contact with positive break
- Connection: screw terminals or connector M23
- Cable section: min. 0.75 mm² max. 2.5 mm² (incl. conductor ferrules)
- Cable entry: 2x M20
- \( U_{\text{imp}} \): 4 kV
- \( U_e \): 250 V
- \( I_{\text{imp}} \): 6 A
- Utilization category: AC-15
- \( I/U_e \): 4 A / 230 VAC
- Max. fuse rating: 6 A gG D-fuse
- Positive break travel: 4.5 mm
- Positive break force: min. 15 N (depending on the setting of the ball latch)
- Magnet: 100% ED
- \( U_e \): 24 VAC/DC 110 VAC, 50/60 Hz 230 VAC, 50/60 Hz
- Power consumption: max. 10 W
- Ambient temperature: -25 °C ... +50 °C
- Actuating speed: max. 0.2 m/s
- Switching frequency: max. 2.000 / h
- Mechanical life: > 1 million operations
- \( F_{\text{max}} \): 2500 N (for each guard)
- Holding force: 30 - 400 N (adjustable)

**Classification**

- Standards: EN ISO 13849-1
- B_{10} NC (NC): 2.000.000
- Mission time: 20 years
- MTTF \( _B = \frac{B_{10}}{0.1 \times n_{\text{op}}} \times \frac{n_{\text{op}} \times d_{\text{op}} \times h_{\text{op}} \times 3600 \text{ s/h}}{t_{\text{cycle}}} \)

**Contact variants**

- Power to unlock
  - 3 NO
  - 3 NC
- Power to lock
  - 3 NO
  - 3 NC

**Approvals**

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>➀</td>
<td>A</td>
<td>Power to unlock</td>
</tr>
<tr>
<td>❼</td>
<td>ST</td>
<td>Power to lock</td>
</tr>
<tr>
<td>➁</td>
<td>STR</td>
<td>Connector M23 bottom</td>
</tr>
<tr>
<td>❼</td>
<td>E</td>
<td>Connector M23 right</td>
</tr>
<tr>
<td>❼</td>
<td>1637</td>
<td>Without manual release</td>
</tr>
<tr>
<td>❼</td>
<td></td>
<td>Manual release using triangular key (only with power to unlock)</td>
</tr>
<tr>
<td>❼</td>
<td></td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

**Note**

Actuators must be ordered separately (refer to page 1-50).

**Note**

Contact symbols shown for the closed condition of the guard device.

The contacts 11-12 and 13-14 are actuated when the solenoid A1-A2 is energized or de-energized.

At least one magnetic contact with positive break must be integrated in the safety circuit.

Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.
Solenoid interlocks

**System components**

<table>
<thead>
<tr>
<th>Straight actuator B1</th>
<th>Flexible actuator B2</th>
<th>Flexible actuator B3</th>
<th>Triangular key M5</th>
</tr>
</thead>
</table>

**Ordering details**

<table>
<thead>
<tr>
<th>Straight actuator</th>
<th>Flexible actuator</th>
<th>Flexible actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZM/AZ 415-B1</td>
<td>AZM/AZ 415-B2</td>
<td>AZM/AZ 415-B3</td>
</tr>
</tbody>
</table>

**Ordering details**

<table>
<thead>
<tr>
<th>Actuator with handle</th>
<th>Actuator with handle</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZM 415-B30</td>
<td>AZM 415-STS30</td>
</tr>
</tbody>
</table>

(A detailed product description can be found on page 1-69)

**Safety door-handle system STS**

<table>
<thead>
<tr>
<th>Actuator with handle</th>
<th>Actuator with handle</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZM 415-STS30</td>
<td>AZM 415-STS30</td>
</tr>
</tbody>
</table>

(A detailed product description can be found on page 1-51)

<table>
<thead>
<tr>
<th>Triangular key M5</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZM KEY</td>
</tr>
</tbody>
</table>
# Solenoid interlocks

## AZM 415-STS30-...

<table>
<thead>
<tr>
<th>System variants</th>
<th>System components</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZM 415-STS30-01</td>
<td></td>
</tr>
<tr>
<td>AZM 415-STS30-02</td>
<td></td>
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<tr>
<td>AZM 415-STS30-03</td>
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<tr>
<td>AZM 415-STS30-04</td>
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</tr>
<tr>
<td>AZM 415-STS30-05</td>
<td></td>
</tr>
<tr>
<td>AZM 415-STS30-06</td>
<td></td>
</tr>
<tr>
<td>AZM 415-STS30-07</td>
<td></td>
</tr>
<tr>
<td>AZM 415-STS30-08</td>
<td></td>
</tr>
</tbody>
</table>

## System components

- **Lockout tag SZ 415-1/2**
- **Lockout tag SZ 415-1/2 -2477**
- **Centering device TF.**
- **Mounting plate MP TG-01**

## Ordering details

**Included in delivery**
- Mounting plate for safety switch
- Actuator incl. mounting plate
- Emergency handle (for variants -05 and -06 incl. mounting plate)

**Ordering example**
To order, first choose the desired safety switch and then the door handle system:
for example AZM 415-02/02ZPK F-230VAC and AZM 415-STS30-07
Solenoid interlocks

**Centering device TFA**

- Mounting outside
- Self-centering of the guard door
- End stop
- Suitable for all types of actuators
- Actuator can be easily inserted or extracted

**Centering device TFI**

- Mounting inside
- Self-centering of the guard door
- End stop
- Suitable for all types of actuators
- Actuator can be easily inserted or extracted
Safe switching and monitoring
Electronic Solenoid and electromagnetic interlocks

Solenoid locking switches are used on sliding, hinged and removable guard doors that must be closed and locked for operator safety. It is a two part system consisting of a switch body, mounted to the guard frame, and a separate actuator key, mounted to the door.

These models feature an integrated electronic safety sensor to detect guard door closure independently of the solenoid lock. These sensors use non-contact operating principles (pulse echo or RFID) that limits wear on components, and tolerates misalignment. A microprocessor provides continuous internal function tests and monitors the safety outputs, meeting PLe to ISO13849-1 and SIL 3 to IEC61508, even when wired in series. Three color LEDs on the sensor indicate status, various errors, and misalignment. For more advanced indication these models are also available with serial diagnostics to connect to commercial field bus systems.
### Technical data

**Standards:**
- IEC/EN 60947-5-1,
- EN ISO 13849-1,
- IEC 61508, IEC 60947-5-3

**Enclosure:**
- glass fiber reinforced thermoplastic, self-extinguishing

**Mechanical life:**
- ≥ 1 million operations

**Fmax:**
- 2000 N

**Latching force:**
- 30 N

**Protection class:**
- IP67 to EN 60529

**Protection class:**
- II, III

**Overvoltage category:**
- III

**Degree of pollution:**
- 3

**Connection:**
- screw terminals or cage clamps or connector M12 or M23

**Cable section:**
- min. 0.25 mm²
- max. 1.5 mm²
  (incl. conductor ferrules)

**Cable entry:**
- M20

**Series-wiring:**
- max. 31 components

**Cable length:**
- max. 200m
  (Cable length and cable section alter the voltage drop depending on the output current)

**Ambient conditions:**
- Ambient temperature: -25 °C … +60 °C
- Storage and transport temperature: -25 °C … +85 °C
- Relative humidity: 30% … 95%, non-condensing
- Resistance to vibration: 10…55 Hz, amplitude 1mm
- Resistance to shock: 30 g / 11 ms
- Switching frequency f: 1 Hz
- Response time: ≤ 60 ms
- Duration of risk: ≤ 120 ms
- Time to readiness: ≤ 4 s
- Actuating speed: ≤ 0.2 m/s

**Solenoid control IN:**
- Ue1: 0 V up to 4 V under Ue
- Ie1: typically 2 mA at 24 V
- Ie2: typically 50 mA

**Solenoid control OUT:**
- Ue3/low: -3 V … 5 V
- Ue3/high: 15 V … 30 V
- Ie3: typically 2 mA at 24 V, dynamically 20 mA

**Safety inputs X1 and X2:**
- p-type, short-circuit proof

**Safety outputs Y1 and Y2:**
- p-type, short-circuit proof

**Diagnostic output OUT:**
- p-type, short-circuit proof

**Utilization category:**
- DC-13

**Leakage current Ile:**
- ≤ 0.25 mA

**Diagnostic functions:**
- Green
  - Supply voltage on
- Yellow
  - Operating status
- Red
  - Error (refer to flash codes)

**Classification:**
- Standards: EN ISO 13849-1; IEC 61508
- Category: 4
- PFH value: 4.0 x 10⁻⁴ /h
- SIL: suitable for SIL 3 applications
- Mission time: 20 years

### Connection

**Connector Cables:**
- M23, 8+1 pole (IP67)
  - Cable length 5 m
  - Cable length 10 m
  - 101209959
  - 101209958
- M12, 8-pole (IP67)
  - Cable length 2.5 m
  - Cable length 5 m
  - Cable length 10 m
  - 103011411
  - 103011412
  - 103011413
- M12, 8-pole (IP69K)
  - Cable length 5 m
  - Cable length 5 m (angled)
  - Cable length 10 m
  - 101210560
  - 101210561
  - 103001389

### Note

The solenoid interlocks and the actuator unit must be ordered separately!

As long as the actuator unit is inserted in the solenoid interlock, the unlocked safety guard can be relocked. In this case, the safety outputs are re-enabled; opening the safety guard is not required.

**Additional Accessories:**
- SD Gateway
  - Page 1-92
- Series-wiring accessories
  - Page 1-94
- Diagnostic tables
  - Online
- Suitable safety controllers
  - Page 5-2
Electronic Solenoid interlocks

**AZM 200 B**

![Image of AZM 200 B](image_url)

**Safety switch with interlocking function**
(Actuator monitoring)

- Thermoplastic enclosure
- Sensor technology permits an offset of ± 5 mm between actuator and interlock
- Intelligent diagnostic
- Accurate adjustment through slotted holes
- 3 LED’s to show the operating status
- Manual release
- 2 safety outputs, 1 diagnostic output
- Latching force 30 N
- Available with AS-Interface Safety at Work

**Suitable for applications**
(without additional second switch)
- up to PL e/category 4 to EN ISO 13849-1
- suitable for SIL 3 applications to IEC 61508
- Series-wiring of max. 31 components, without detriment to the category

**Approvals**

![TUV CE mark](image_url)

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>SK</td>
<td>Screw terminals</td>
</tr>
<tr>
<td>②</td>
<td>CC</td>
<td>Cage clamps</td>
</tr>
<tr>
<td>③</td>
<td>ST1</td>
<td>Connector M23, (8+1)-pole</td>
</tr>
<tr>
<td>④</td>
<td>ST2</td>
<td>Connector M12, 8-pole</td>
</tr>
<tr>
<td>⑤</td>
<td>1P2PW</td>
<td>1 diagnostic output and 2 safety outputs, all p-type and combined diagnostic signal: safety guard closed AND solenoid interlock locked</td>
</tr>
<tr>
<td>⑥</td>
<td>SD2P</td>
<td>Serial diagnostic output and 2 safety outputs, p-type</td>
</tr>
<tr>
<td>⑦</td>
<td>A</td>
<td>Power to unlock</td>
</tr>
</tbody>
</table>

**Note**
The safety switch with interlocking function and the actuator must be ordered separately!

**Additional Accessories**

- SD Gateway
- Series-wiring accessories
- Diagnostic tables
- Suitable safety controllers

**Connection**

- Connector Cables:
  - M23, 8+1 pole (IP67)
  - M12, 8-pole (IP69K)

For more information, see our online product catalog: www.usa.schmersal.net

### Technical data

**Electrical data:**
- $U_e$: 24 VDC -15% / +10%
- $I_e$: 1.2 A
- $I_0$: max. 0.5 A
- $U_{imp}$: 800 V
- $U_i$: 32 VDC

**Fuse rating:**
- Screw terminals or cage clamps: ≤ 4 A when used to UL 508;
- Connector M12 or M23:  ≤ 2 A

**Safety inputs X1 and X2:**
- p-type, short-circuit proof

**Technical data**

- **Ambient conditions:**
  - Ambient temperature: -25 °C … +60 °C
  - Storage and transport temperature: -25 °C … +85 °C
  - Relative humidity: 30% … 95%, non-condensing

- **Resistance to vibration:** 10…55 Hz, amplitude 1mm

- **Resistance to shock:** 30 g / 11 ms

- **Response time:** < 60 ms

- **Duration of risk:** < 120 ms

- **Time to readiness:** < 4 s

- **Actuating speed:** ≤ 0.2 m/s

**Diagnostic output OUT:**
- p-type, short-circuit proof

**Solenoid control IN:**
- p-type, short-circuit proof

**Mission time:** 20 years

For more information, see our online product catalog: www.usa.schmersal.net
Electronic Solenoid interlocks

**AZ/AZM 200-B1-...**

- Actuator for sliding guards
- Actuator with return spring
- Tolerates overtravel of up to max. 5 mm
- With door detection sensor T
- Available with or without emergency exit (P0)

### Technical data

**Material:**
- B1-housing: Grivory
- Actuator: zinc die-cast

**Mechanical life:**
- $F_{\text{max}} \text{ AZM 200:} \geq 1 \text{ million operations}$
- $2000 \text{ N}$

### System components

- Actuator B1 with emergency exit P0
- Lockout tag SZ 200
- Lockout tag SZ 200-1

### Approvals

Approvals only in combination with switches AZ/AZM 200

### Ordering details

#### AZ/AZM 200-B1-\(\mathbf{1}\)\(\mathbf{T}\)\(\mathbf{2}\)

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>L</td>
<td>Actuating direction left</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>Actuating direction right</td>
</tr>
<tr>
<td>2</td>
<td>P0</td>
<td>Without emergency exit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>With emergency exit</td>
</tr>
</tbody>
</table>

### Note

The safety switches/solenoid interlocks and the actuator unit must be ordered separately!

### Ordering details

- **Actuator B1 with emergency exit** AZ/AZM 200-B1-...-P0
- Lockout tag SZ 200-1
- Lockout tag SZ 200
Electronic Solenoid interlocks

**AZ/AZM 200-B30-...**

- Actuator for hinged guards
- One-hand emergency exit, even in de-energized condition
- With door detection sensor T
- Easy and intuitive operation
- NO risk of injury from protruding actuator
- No supplementary door handles required
- Does not protrude into the door opening
- Various handles available
- Can be fitted with or without emergency exit

**Approvals**

Approvals only in combination with switches AZ/AZM 200

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>L</td>
<td>Door hinge on left-hand side</td>
</tr>
<tr>
<td>②</td>
<td>R</td>
<td>Door hinge on right-hand side</td>
</tr>
<tr>
<td>③</td>
<td>G1</td>
<td>With door handle</td>
</tr>
<tr>
<td>④</td>
<td>G2</td>
<td>With rotary button</td>
</tr>
<tr>
<td>⑤</td>
<td>P1</td>
<td>With emergency exit</td>
</tr>
<tr>
<td>⑥</td>
<td>P20</td>
<td>With emergency exit metal</td>
</tr>
<tr>
<td>⑦</td>
<td>P25</td>
<td>With emergency exit with inset handle</td>
</tr>
<tr>
<td>⑧</td>
<td>SZ</td>
<td>Without lockout tag</td>
</tr>
</tbody>
</table>

**Note**

The safety switches/solenoid interlocks and the actuator unit must be ordered separately!

The actuator can be combined with a three-point locking rod to increase the stability of large and especially double-leaf safety guards. See page 1-59

Retrofitting kit (only for AZ/AZM 200-B30-...-P1 with emergency exit) RF-AZ/AZM200-B30-SZ

**Technical data**

- Material:
  - Actuator unit B30: glass fiber reinforced thermoplastic, self-extinguishing, fixing holes with metal washer
  - Emergency exit P1: glass fiber reinforced thermoplastic, self-extinguishing, fixing holes with metal washer
  - Door handle G1, G2: plastic coated aluminum
  - Panic handle P1, P20, P25: plastic coated aluminum
  - Actuator: zinc die-cast
  - Mechanical life: ≥ 1 million operations
  - F<sub>max</sub> AZM 200: 2000 N

**System components**

- Rotary button
- Emergency exit metal
- Inset handle
- Actuator B30 with lockout tag SZ

**Ordering details**

- Actuator with rotary button AZ/AZM 200-...-G2
- Emergency exit metal AZ/AZM 200-...-P20
- Actuator B30 with lockout tag SZ AZ/AZM 200-B30-.SZ
- Lockout tag SZ 200-1
- Lockout tag mounting plate MP-BDF200
Electronic Solenoid interlocks

**AZ/AZM 200-B40-...**

- Actuator for hinged and movable safety guards, especially for hinged doors with overlapping hinge
- One-hand emergency exit, even in de-energized condition
- With door detection sensor T
- Easy and intuitive operation
- No risk of injury from protruding actuator
- No supplementary door handles required
- Does not protrude into the door opening
- Various handles available
- Can be fitted with or without emergency exit

**Technical data**

**Material:**
- Actuator unit B40: glass fiber reinforced thermoplastic, self-extinguishing, fixing holes with metal washer
- Emergency exit P1: glass fiber reinforced thermoplastic, self-extinguishing, fixing holes with metal washer
- Door handle G1, G2: plastic coated aluminum
- Panic handle P1, P20, P25: plastic coated aluminum
- Actuator: zinc die-cast

**Mechanical life:**
- $F_{\text{max}}$, AZM 200: ≥ 1 million operations
- $F_{\text{max}}$, AZM 200: 2000 N

**System components**

- **Rotary button**
- **Emergency exit metal**
- **Inset handle**
- **Lockout tag SZ 200-1**

**Approvals**

Approvals only in combination with switches AZ/AZM 200

**Ordering details**

<table>
<thead>
<tr>
<th>AZ/AZM 200-B40-...</th>
<th>TA</th>
<th>TA</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>TA</td>
<td>TA</td>
<td>Door hinge on left-hand side</td>
</tr>
<tr>
<td>R</td>
<td></td>
<td>TA</td>
<td>Door hinge on right-hand side</td>
</tr>
<tr>
<td>G1</td>
<td></td>
<td>TA</td>
<td>With door handle</td>
</tr>
<tr>
<td>G2</td>
<td></td>
<td>TA</td>
<td>With rotary button</td>
</tr>
<tr>
<td>P1</td>
<td></td>
<td>TA</td>
<td>With emergency exit</td>
</tr>
<tr>
<td>P20</td>
<td></td>
<td>TA</td>
<td>With emergency exit metal</td>
</tr>
<tr>
<td>P25</td>
<td></td>
<td>TA</td>
<td>With emergency exit with inset handle</td>
</tr>
</tbody>
</table>

**Note**

The safety switches/solenoid interlocks and the actuator unit must be ordered separately!

**Ordering details**

- Actuator with rotary button: AZ/AZM 200-...-G2
- Emergency exit metal with inset handle: AZ/AZM 200-...-P20
- AZ/AZM 200-...-P25
- Lockout tag: SZ 200-1
- Lockout tag: SZ 200
Electronic Solenoid interlocks

**AZ/AZM 200-B30-...-P30/P31**

- Actuator for hinged and sliding guards, especially for double-leaf doors
- Three-point locking bar for applications with higher mechanical stability requirements (7,000 N)
- Door height max. 230 cm
- One-hand emergency exit, even in de-energized condition
- With door detection sensor T
- Easy and intuitive operation
- No risk of injury from protruding actuator
- No supplementary door handles required
- Does not protrude into the door opening
- Various handles available
- Can be fitted with or without emergency exit

**Technical data**

- **Material:**
  - Actuator unit B30: glass fiber reinforced thermoplastic, self-extinguishing, fixing holes with metal washer
  - Locking bar: zinc-plated metal
  - Emergency exit: metal
  - Door handle G1, G2: plastic coated aluminum
  - Panic handle: plastic coated aluminum
  - Actuator: zinc die-cast

- **Mechanical life:** ≥ 1 million operations
- **Fmax AZM 200:** 2000 N

**System components**

- Rotary button
- Lockout tag SZ 200
- Lockout tag SZ 200-1
- Actuator B30 with lockout tag SZ

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>L</td>
<td>Door hinge on left-hand side</td>
</tr>
<tr>
<td>2</td>
<td>R</td>
<td>Door hinge on right-hand side</td>
</tr>
<tr>
<td>3</td>
<td>G1</td>
<td>With door handle</td>
</tr>
<tr>
<td></td>
<td>G2</td>
<td>With rotary button</td>
</tr>
<tr>
<td>4</td>
<td>P30</td>
<td>Without emergency exit</td>
</tr>
<tr>
<td></td>
<td>P31</td>
<td>With emergency exit</td>
</tr>
<tr>
<td>5</td>
<td>SZ</td>
<td>Without lockout tag</td>
</tr>
<tr>
<td></td>
<td></td>
<td>With lockout tag</td>
</tr>
</tbody>
</table>

**Note**

The safety switches/solenoid interlocks and the actuator unit must be ordered separately!

Retrofitting kit (only for AZ/AZM 200-B30-...-P1 with emergency exit) RF-AZ/AZM200-B30-SZ

**Ordering details**

- Actuator with rotary button **AZ/AZM 200-...-G2**
- Lockout tag **SZ 200**
- Lockout tag **SZ 200-1**
- Actuator B30 with lockout tag **SZ 200**
- Actuator B30 with lockout tag **SZ 200**
Electronic Solenoid interlocks

MZM 100

Solenoid interlock (Solenoid interlock monitoring)
- Innovating and unique operating principle
- Accurate adjustment through slotted holes
- Power to lock principle
- Solenoid interlock must be used as end stop.
- Automatic latching with variable adjustment
- Latching force through permanent magnet approx. 30 N, also in de-energized condition
- Sensor technology permits an offset between actuator and interlock of ± 5 mm vertically and ± 3 mm horizontally
- Intelligent diagnostic signalling of failures
- 3 LED’s to show the operating status
- Series-wiring of max. 31 components, without detriment to the category
- AS-Interface Safety at Work available

Technical data

| Standards: | IEC 60947-5-3, EN ISO 13849-1, IEC 61508 |
| Enclosure: | glass fiber reinforced thermoplastic, self-extinguishing |
| Mechanical life: | ≥ 1 million operations (for guards ≤ 5 kg; actuating speed ≤ 0.5 m/s) |
| Electrically adjustable latching force (RE): | 30 N … 100 N |
| Permanent magnet (M): | 30 N |
| Holding force Fmax typically: | 750 N |
| Holding force F guaranteed: | 500 N |
| Protection class: | IP65 / IP67 |
| Degree of pollution: | 3 |
| Connection: | connector M12 or M23 |
| Series-wiring: | max. 31 components |
| Cable length: | max. 200 m |

Technical data

Safety inputs X1 and X2:
- Voltage range – 3V … 5V: Low
- Voltage range 15V … 30V: High,
  typ. 4 mA at 24 V

Safety outputs Y1 and Y2:
- p-type, short-circuit proof
  - Uy1: 24 V
  - Iy1: 0.25 A
  - Voltage drop: < 1 V
  - Utilization category: DC-13
  - Leakage current Iy: ≤ 0.5 mA

Diagnostic output OUT:
- p-type, short-circuit proof
  - Uy2: 0 V up to 4 V under Uy,
  - Iy2: max. 0.05 A
  - Utilization category: DC-13
  - Wiring capacitance for serial diagnostic: max. 50 nF

Solenoid control IN:
- Voltage range – 3V … 5V: Low
- Voltage range 15V … 30V: High,
  typ. 10 mA at 24 V, dynamically 20 mA
- Solenoid: 100% ED

LED functions
- Green: Supply voltage on
- Yellow: Operating status
- Red: Error

Classification:
- Standards: EN ISO 13849-1, IEC 61508
- Classification: EN 61508 PL: e
- Category: 4
- PFH value: 3.5 x 10⁻⁹ / h
- SIL: suitable for SIL 3 applications
- Mission time: 20 years

The latching force of the MZM 100 can be set in steps of approx. 10 N each within a range of approx. 30 N (factory setting) to approx. 100 N. To this end, the adjustment target MZM 100 TARGET is used directly on the fitted MZM 100.

The solenoid interlock, the actuating unit and the adjustment target must be ordered separately!

Approvals

Ordering details

<table>
<thead>
<tr>
<th>MZM 100</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option</td>
<td>Description</td>
</tr>
<tr>
<td>➁ ST</td>
<td>Connector M23, (8+1)-pole</td>
</tr>
<tr>
<td>➁ ST2</td>
<td>Connector M12, 8-pole</td>
</tr>
<tr>
<td>② 1P2PW</td>
<td>1 diagnostic output and 2 safety outputs, all p-type with combined diagnostic signal: safety guard closed and magnetic interlock locked</td>
</tr>
<tr>
<td>③ SD2P</td>
<td>Serial diagnostic output and 2 safety outputs, p-type</td>
</tr>
</tbody>
</table>

Ordering details

<table>
<thead>
<tr>
<th>MZM 100</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option</td>
<td>Description</td>
</tr>
<tr>
<td>➁ R</td>
<td>Without latching</td>
</tr>
<tr>
<td>② RE</td>
<td>Latching force (35 N)</td>
</tr>
<tr>
<td>③ M</td>
<td>Adjustable latching force approx. 30 … 100 N</td>
</tr>
<tr>
<td>④</td>
<td>Permanent magnet approx. 30 N</td>
</tr>
</tbody>
</table>

Connection

<table>
<thead>
<tr>
<th>Connector Cables:</th>
<th>M23, 8+1 pole (IP67)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable length 5 m</td>
<td>101209959</td>
</tr>
<tr>
<td>Cable length 10 m</td>
<td>101209958</td>
</tr>
<tr>
<td>M12, 8-pole (IP67)</td>
<td>103011411</td>
</tr>
<tr>
<td>Cable length 2.5 m</td>
<td>103011412</td>
</tr>
<tr>
<td>Cable length 5 m</td>
<td>103011413</td>
</tr>
<tr>
<td>Cable length 10 m</td>
<td>103011414</td>
</tr>
</tbody>
</table>

Additional Accessories:
- SD Gateway: Page 1-92
- Series-wiring accessories: Page 1-94
- Diagnostic tables: Online
- Suitable safety controllers: Page 5-2
Electronic Solenoid interlocks

MZM 100 B

Safety sensor with interlocking function (Actuator monitoring)
- Innovating and unique operating principle
- Accurate adjustment through slotted holes
- Power to lock principle
- Safety sensor must be used as end stop.
- Automatic latching with variable adjustment
- Latching force through permanent magnet approx. 30 N, also in de-energized condition
- Sensor technology permits an offset between actuator and sensor of ± 5 mm vertically and ± 3 mm horizontally
- Intelligent diagnostic signalling of failures
- 3 LED's to show the operating status
- Series-wiring of max. 31 components, without detriment to the category
- AS-Interface Safety at Work available

Technical data

<table>
<thead>
<tr>
<th>Standards</th>
<th>EN ISO 13849-1, IEC 61508</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure</td>
<td>glass fiber reinforced thermoplastic, self-extinguishing</td>
</tr>
<tr>
<td>Mechanical life</td>
<td>≥ 1 million operations (for guards ≤ 5 kg; actuating speed ≤ 0.5 m/s)</td>
</tr>
<tr>
<td>Electrically adjustable latching force (RE)</td>
<td>30 N … 100 N</td>
</tr>
<tr>
<td>Permanent magnet (M)</td>
<td>30 N</td>
</tr>
<tr>
<td>Holding force F_max, typically</td>
<td>750 N</td>
</tr>
<tr>
<td>Holding force F guaranteed</td>
<td>500 N</td>
</tr>
<tr>
<td>Protection class</td>
<td>IIP65 / IIP67</td>
</tr>
<tr>
<td>Protection class</td>
<td>II, III</td>
</tr>
<tr>
<td>Degree of pollution</td>
<td>3</td>
</tr>
<tr>
<td>Connection</td>
<td>connector M12 or M23</td>
</tr>
<tr>
<td>Series-wiring</td>
<td>max. 31 components</td>
</tr>
<tr>
<td>Cable length</td>
<td>max. 200 m</td>
</tr>
<tr>
<td>(Cable length and cable section alter the voltage drop depending on the output current)</td>
<td></td>
</tr>
<tr>
<td>Ambient conditions:</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-25 °C ... +55 °C</td>
</tr>
<tr>
<td>Storage and transport temperature</td>
<td>-25 °C ... +85 °C</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>30% ... 95%, non-condensing, no icing</td>
</tr>
<tr>
<td>Resistance to vibration</td>
<td>10 ... 150 Hz (0.35 mm/5 g)</td>
</tr>
<tr>
<td>Resistance to shock</td>
<td>30 g / 11 ms</td>
</tr>
<tr>
<td>Switching frequency f</td>
<td>1 Hz</td>
</tr>
<tr>
<td>Response time</td>
<td>&lt; 150 ms</td>
</tr>
<tr>
<td>Duration of risk</td>
<td>&lt; 150 ms</td>
</tr>
<tr>
<td>Time to readiness</td>
<td>&lt; 4 s</td>
</tr>
<tr>
<td>Electrical data:</td>
<td></td>
</tr>
<tr>
<td>U_e</td>
<td>24 VDC -15% / +10% (stabilised PELV)</td>
</tr>
<tr>
<td>Operating current</td>
<td>max. 0.6 A plus current through the safety outputs</td>
</tr>
<tr>
<td>I_1</td>
<td>1 A</td>
</tr>
<tr>
<td>U_e</td>
<td>800 V</td>
</tr>
<tr>
<td>U_e</td>
<td>32 VDC</td>
</tr>
<tr>
<td>Device insulation</td>
<td>≤ 2 A to UL 508; depending on the number of components and loads (Y1, Y2 and OUT)</td>
</tr>
</tbody>
</table>

Solenoid control IN:
- Voltage range – 3V ... 5V: Low
- Voltage range 15V ... 30V: High, typically 10 mA at 24 V; dynamically 20 mA

LED functions
- Green: Supply voltage on
- Yellow: Operating status
- Red: Error

Classification:
| Standards | EN ISO 13849-1, IEC 61508 |
| PL | e |
| Category | 4 |
| PFH value | 3.5 x 10^6 / h |
| SIL | suitable for SIL 3 applications |
| Mission time | 20 years |

The latching force of the MZM 100 B can be set in steps of approx. 10 N each within a range of approx. 30 N (factory setting) to approx. 100 N. To this end, the adjustment target MZM 100 TARGET is used directly on the fitted MZM 100 B.

Ordering details

MZM 100 B

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ST</td>
<td>Connector M23, (8+1)-pole</td>
</tr>
<tr>
<td></td>
<td>ST2</td>
<td>Connector M12, 8-pole</td>
</tr>
<tr>
<td>2</td>
<td>1P2PW2</td>
<td>1 diagnostic output and 2 safety outputs, all p-type with combined diagnostic signal: safety guard closed and can be locked</td>
</tr>
<tr>
<td></td>
<td>SD2P</td>
<td>Serial diagnostic output and 2 safety outputs, p-type Permanent magnet approx. 30 N</td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td></td>
</tr>
</tbody>
</table>

The safety sensor with interlocking function, the actuating unit and the adjustment target must be ordered separately!

Connection

<table>
<thead>
<tr>
<th>Connector Cables:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>M23, 8+1 pole (IP67)</td>
<td>101209959</td>
</tr>
<tr>
<td>Cable length 5 m</td>
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<td>103011412</td>
</tr>
<tr>
<td>Cable length 10 m</td>
<td>103011413</td>
</tr>
</tbody>
</table>

Additional Accessories:
- SD Gateway: Page 1-92
- Series-wiring accessories: Page 1-94
- Diagnostic tables: Online
- Suitable safety controllers: Page 5-2

For more information, see our online product catalog: www.usa.schmersal.net

For more detailed information, see our online product catalog: www.usa.schmersal.net
Electronic Solenoid interlocks

Safety monitoring module

Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

Diagnostic

Depending on the component variant, the following diagnostic signals are transmitted:

MZM 100 ..-1P2PW variant:
OUT Combined diagnostic signal: safety guard closed and magnetic interlock locked

MZM 100 B ..-1P2PW2 variant:
OUT Combined diagnostic signal: safety guard closed and can be locked

Operating principle of the diagnostic output

The short-circuit proof diagnostic output OUT can be used for central indicating or control functions, for instance in a PLC.

The diagnostic output is not a safety-relevant output!

Serial diagnostic

Detailed information about the use of the serial diagnostics can be found in the operating instructions of the PROFIBUS-Gateway SD-I-DPV0-2 and the Universal-Gateway SD-I-U-…. and in the instructions for the integration of the SD-Gateway.

Misalignment

Misalignment

± 5 mm

± 3 mm
Electronic Solenoid interlocks

**Actuator MZM 100-B1.1**

- The magnetic interlocks and the actuator unit must be ordered separately!
- Actuator free from play, i.e. neutralization of undesired noises

**MZM 100 TARGET**

- Adjustment target for variable adjustment of the latching force of the MZM 100
- Gradually adjustable by steps of approx. 10 N each within the range from approx. 30 N to 100 N
- The adjustment target must be ordered separately

**System components**

- Mounting kit MS MZM 100-W

---

**Ordering details**

- **Actuator** MZM 100-B1.1
- **Adjustment target** MZM 100 TARGET
- **Mounting kit** MS MZM 100-W
Electronic Solenoid interlocks

Sensor AZM300

Actuator AZM300

Technical data

- Standards: IEC 60947-5-3, IEC 60947-5-1, IEC 61508, EN ISO 13849-1
- Enclosure: glass-fibre reinforced thermoplastic
- Mode of operation: RFID
- Actuator: AZM300-B1
- Series-wiring: unlimited number of components, up to 200 M; max. 31 components for serial diagnosis
- Connection: Integrated connector M12, 8-pole, A-coded

Switching distances to IEC 60947-5-3:
- Rates switching distance $S_n$: 2 mm
- Assured switch-on point $S_{ao}$: 1 mm
- Assured switch-off point $S_{ar}$: 20 mm
- Minimum distance between two sensors: 100 mm

Ambient conditions:
- Ambient temperature $T_u$: $0 \degree C \ldots +60 \degree C$
- Storage and transport temperature: $-10 \degree C \ldots +90 \degree C$
- Protection class: IP66 / IP67 to EN 60529; IP69K to DIN 40050-9

Mechanical Data:
- Mechanical life: $\geq 1,000,000$ operations
- Clamping force: 1,000 N
- Latching force: 25 N / 50 N
- End stop: 5 kg guard door, 0.5 m/s
- $\geq 50,000$ operations
- Actuator misalignment: $\leq 2$
- Emergency unlocking device (Y/N): No
- Manual release (Y/N): Yes
- Emergency release (Y/N): Yes
- Resistance to vibration: 10...150 Hz, amplitude 0.35 mm
- Resistance to shock: 30 g / 11 ms

Electrical data:
- Switching frequency $f$: 0.5 Hz
- Response time: 120 ms
- Duration of risk: $< 200$ ms
- Standby delay: $\leq 5$ s
- Rated Supply voltage $U_s$: 24 VDC -15% / +10% (PELV)

Power consumption with solenoid enabled: 0.25 A
Power consumption without load: 0.1 A
Required rated short-circuit current: 100 A

Approvals

TÜV ECOLAB

Ordering details

Sensor AZM300

Actuator AZM300

Ordering details

Additional Accessories:
- SD Gateway
- Series-wiring accessories
- Diagnostic tables
- Suitable safety controllers

Ordering details

Series-wiring accessories
Page 1-94
Diagnostic tables
Online
Suitable safety controllers
Page 5-2

N and T release handle placement
Electronic Solenoid interlocks

Technical data

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated insulation voltage $U_i$:</td>
<td>32 V</td>
</tr>
<tr>
<td>Rated impulse withstand voltage $U_{imp}$:</td>
<td>800 V</td>
</tr>
<tr>
<td>No-load current $I_0$:</td>
<td>35 mA</td>
</tr>
<tr>
<td>Protection class:</td>
<td>II</td>
</tr>
<tr>
<td>Overvoltage category:</td>
<td>III</td>
</tr>
<tr>
<td>Degree of pollution:</td>
<td>3</td>
</tr>
<tr>
<td>Safety inputs X1/X2:</td>
<td></td>
</tr>
<tr>
<td>Rated operating voltage $U_{op}$:</td>
<td>24 VDC -15% / +10% (PELV to IEC 60204-1)</td>
</tr>
<tr>
<td>Current consumption per input:</td>
<td>5 mA</td>
</tr>
<tr>
<td>Safety outputs Y1/Y2:</td>
<td>p-type, short-circuit proof</td>
</tr>
<tr>
<td>Rated operating current $I_{op}$:</td>
<td>max. 0.25 A</td>
</tr>
<tr>
<td>Utilization category:</td>
<td>AC-12: $U_{op}$: 24V AC/0.25 A</td>
</tr>
<tr>
<td></td>
<td>DC-13: $U_{op}$: 24V DC/0.25 A</td>
</tr>
<tr>
<td>Voltage drop:</td>
<td>&lt; 1 V</td>
</tr>
<tr>
<td>Diagnostic output:</td>
<td>p-type, short-circuit proof</td>
</tr>
<tr>
<td>Rated operating current $I_{di}$:</td>
<td>max. 0.05 A</td>
</tr>
<tr>
<td>Utilization category:</td>
<td>AC-12: $U_{di}$: 24V AC/0.05 A</td>
</tr>
<tr>
<td></td>
<td>DC-13: $U_{di}$: 24V DC/0.05 A</td>
</tr>
<tr>
<td>Voltage drop:</td>
<td>&lt; 2 V</td>
</tr>
<tr>
<td>Serial diagnostic:</td>
<td>short-circuit proof</td>
</tr>
<tr>
<td>Operating current:</td>
<td>150 mA</td>
</tr>
<tr>
<td>Wiring capacitance for serial:</td>
<td>max. 50 nF</td>
</tr>
<tr>
<td>External cable protection:</td>
<td>Fuse</td>
</tr>
<tr>
<td>Integrated connector:</td>
<td>2.0 A</td>
</tr>
<tr>
<td>Connecting cable:</td>
<td>4.0 A</td>
</tr>
<tr>
<td>LED functions:</td>
<td></td>
</tr>
<tr>
<td>Green</td>
<td>Supply voltage on</td>
</tr>
<tr>
<td>Yellow</td>
<td>Operating status</td>
</tr>
<tr>
<td>Red</td>
<td>Error</td>
</tr>
<tr>
<td>Classification:</td>
<td>EN ISO 13849-1, IEC 61508, IEC 62061</td>
</tr>
<tr>
<td>Standards:</td>
<td></td>
</tr>
<tr>
<td>PL:</td>
<td>e</td>
</tr>
<tr>
<td>Category:</td>
<td>4</td>
</tr>
<tr>
<td>PFH:</td>
<td>$5.2 \times 10^{-9}$/h</td>
</tr>
<tr>
<td>SIL:</td>
<td>suitable for SIL 3 applications</td>
</tr>
<tr>
<td>Mission time:</td>
<td>20 years</td>
</tr>
</tbody>
</table>

Note

Requirements for the safety controller
Dual-channel safety input, suitable for p-type sensors with normally-open (NO) function. The internal function tests of the sensors cause the outputs to cyclically switch off for max. 0.25 ms, this must be tolerated by the safety controller. The safety controller must not be equipped with cross-wire detection.

Detailed information about the use of the serial diagnostics can be found in the operating instructions of the PROFIBUS-Gateway SD-I-DPV0-2 and the Universal-Gateway SD-I-U-…. and in the instructions for the integration of the SD-Gateway.

Coding procedure

Ordering option -I1:
During the individual coding, an actuator is taught by a simple routine during the start-up procedure, so that every form of tampering by means of a replacement or substitute actuator is permanently excluded.

Ordering option -I2:
Teaching the individual coding of an actuator by a simple routine during the start-up procedure (as -I1). A protected coding process enables the teaching of a new actuator for service purposes. Previous actuators are overridden and will no longer be recognized. There is a 10 minute delay after teaching in a new actuator before the switch will function again.

Ordering details

Mounting
Spacer plate                  MP-AZ/AZM300-1
Actuator mounting kit        MS-AZ/AZM300-B1

Connector Cables
M12, 8-pole (IP67)           103011411
103011412
103011413
M12, 8-pole (IP69K)           101210561
101210562
103001389
Lock out/Tag out device      SZ200-1

System components

Mounting Plate
Mounting Set
Lock out/Tag out device
Electronic Solenoid interlocks

Sensor AZM400

- Bistable, motor driven system
- Holding force of 10,000 N
- Die-cast aluminum enclosure
- 2 short-circuit proof, p-type safety outputs (24 VDC per 250 mA)
- Increased protection against tampering by optional individual coding of safety sensor and actuator
- Manual release or Emergency exit
- LED status indication
- PLe / cat 4 / SIL3 for interlocking and guard locking function
- Protection class IP66 / IP67

Sensor AZM400...-E

- Electronic manual release version
- Includes second diagnostic output
- Second M12 connector to connect to auxiliary power supply

Technical data

Standards: IEC 60947-5-1, IEC 61508, ISO 14119, EN ISO 13849-1
Enclosure: aluminum, die cast
Mode of operation: magnetic field/RFID
Actuator: AZM400-B1
Connection:
ST: 1 connector: M12, 8-pole, A-coded
ST2: 2 connector: M12, 8-pole/5-pole, A-coded
Switching distances:
Allowable distance actuator/device incl. angle displacement: 1 ... 7 mm
Minimum distance between sensors: 30 mm

Ambient conditions:
Ambient temperature: 0 °C ... +55 °C
Storage and transport temperature: -40 °C ... +85 °C
Protection class: IP66 / IP67 to EN 60529

Mechanical Data:
Mechanical life: >= 1,000,000 operations
Holding force: 10,000 N
Actuator misalignment: +/- 4 mm
Emergency unlocking device (Y/N): Yes
Manual release (Y/N): Yes
Emergency release (Y/N): Yes
Resistance to vibration: 10...150 Hz, amplitude 0.35 mm
Resistance to shock: 30 g / 11 ms

Electrical data:
Switching frequency f: 0.3 Hz
Response time: ≤ 100 ms
Min. open / close cycle (motor): 3 s
- with continuous operation: min. average cycle time: 20 s
Rated Supply voltage U_r: 24 VDC -15% / +10% (PELV)
Power consumption: 0.1 A
Operating current when bolt being driven: max 0.6 A
Required rated short-circuit current: 100 A

Note

Bistable motorized lock:
The AZM400 solenoid interlock is bistable: power-to-lock and power-to-unlock. If power is lost, the lock bolt remains in its last position.

Block Drive:
If the locking bolt does not reach the “locked” condition with the first attempt, the AZM400 makes an autonomous attempt. If the second attempt also fails, the AZM400 will signal a fault. After malfunction, condition of the control inputs has to be changed to allow the locking bolt to be driven out again.

Ordering details

AZM400Z-ST-①-1P2P-②
No. | Option | Description
---|---|---
① | I1 | Standard coding version
   | I2 | Individual coding (Irreversible)
   | T  | Manual release
② | E  | Emergency release knob

AZM400Z-ST2-①-2P2P-②-E
No. | Option | Description
---|---|---
① | I1 | Standard coding version
   | I2 | Individual coding (Irreversible)
② | T  | Manual release

Actuator, cables, and other accessories ordered separately

For more information, see our online product catalog: www.usa.schmersal.net
Electronic Solenoid interlocks

Technical data

- Rated insulation voltage $U_i$: 32 V
- Rated impulse withstand voltage $U_{imp}$: 800 V
- Protection class: III
- Overvoltage category: III
- Degree of pollution: 3
- Control inputs to unlock: E1 and E2, p-type; E3, n-type

Safety inputs:
- Switching thresholds: - 3 V ... 5 V (low)
- 15 V ... 30 V (high)
- Current consumption per input: > 10 mA ... < 15 mA / 24 V

Safety outputs Y1/Y2:
- p-type, short-circuit proof
- ST1: 1 diagnostic output, OUT
- ST2: 2 diagnostic outputs, OUT1 and OUT2
- Rated operating current $I_{o}^{ST1}$: max. 0.25 A
- Rated operating current $I_{o}^{ST2}$: max. 0.05 A
- Utilization category: AC-12: $U_e/I_e$: 24V AC/0.25 A
- DC-13: $U_e/I_e$: 24V DC/0.25 A
- Voltage drop: ≤ 2 V

Diagnostic output:
- p-type, short-circuit proof
- Rated operating current $I_{o}^{diag}$: max. 0.05 A
- Utilization category: AC-12: $U_e/I_e$: 24V AC/0.25 A
- DC-13: $U_e/I_e$: 24V DC/0.25 A
- Voltage drop: < 2 V

LED functions:
- Green: Supply voltage on
- Yellow: Operating status
- Red: Error code flashes

Classification: (interlock function)
- Standards: EN ISO 13849-1, IEC 61508
- PL: e
- Category: 4
- PFH: 1.0 x 10^{-3}/h
- PFD: 9.0 x 10^{-5}
- SIL: suitable for SIL 3 applications
- Mission time: 20 years

Classification: (guard lock function)
- Standards: EN ISO 13849-1, IEC 61508
- PL: e
- Category: 4
- PFH: 1.8 x 10^{-3}/h
- PFD: 1.6 x 10^{-4}
- SIL: suitable for SIL 3 applications
- Mission time: 20 years

Note

Requirements for the safety controller
- Dual-channel safety input, suitable for p-type sensors with normally-open (NO) function.
- The internal function tests of the sensors cause the outputs to cyclically switch off for max. 0.25 ms, this must be tolerated by the safety controller. The safety controller must not be equipped with cross-wire detection.

Misalignment

Misalignment tolerances

- X-Axis: ± 4 mm.
- Y-Axis: ± 4 mm.
- Z Axis: distance between actuator and switch housing should be between 1 mm to 7 mm, with max angle offset of 2°

Wiring examples:

Use of safety outputs of the type P/P

Use of the safety controls of the type P/N

System components

Ordering details

- Actuator: AZM400-B1
- Mounting set: MS-AZM400
- For 40mm profile installations

Connection cables
- M12, 8-pole (IP67)
- Cable length 2.5 m: 103011411
- Cable length 5 m: 103011412
- Cable length 10 m: 103011413
- M12, 5-pole (IP67)
- Cable length 5 m: 103010816
- Cable length 10 m: 103010818

Additional Accessories:
- Manual bypass key (M5 triangle)
- Diagnostic tables
- Suitable safety controllers
Electronic Solenoid interlocks

Connectors M12, 8-pole for AZM 200, MZM 100, AZM300, AZM400

Function of the safety switchgear

<table>
<thead>
<tr>
<th>AZM200 / AZM300 / MZM100</th>
<th>AZM400</th>
<th>AZM400...-E</th>
</tr>
</thead>
<tbody>
<tr>
<td>with conventional diagnostic output</td>
<td>with serial diagnostics</td>
<td>Pin configuration of the integrated connector</td>
</tr>
<tr>
<td>A1</td>
<td>U_e</td>
<td>U_e</td>
</tr>
<tr>
<td>X1</td>
<td>Safety input 1</td>
<td>Safety input 1</td>
</tr>
<tr>
<td>A2</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>Y1</td>
<td>Safety output 1</td>
<td>Safety output 1</td>
</tr>
<tr>
<td>OUT</td>
<td>Diagnostic output</td>
<td>SD output</td>
</tr>
<tr>
<td>X2</td>
<td>Safety input 2</td>
<td>Safety input 2</td>
</tr>
<tr>
<td>Y2</td>
<td>Safety output 2</td>
<td>Safety output 2</td>
</tr>
<tr>
<td>IN</td>
<td>Solenoid control</td>
<td>SD input</td>
</tr>
</tbody>
</table>

Ordering details

Connecting cables with female connector
- IP67, M12, 8-pole - 8 x 0.23 mm
  - Cable length 2.5 m: 103011411
  - Cable length 5 m: 103011412
  - Cable length 10 m: 103011413

Connecting cables with female connector
- IP67/IP69K, M12, 8-pole - 8 x 0.21 mm
  - Cable length 5 m, angled: 101210560
  - Cable length 5 m, angled: 101210561

Connecting cables with female connector
- M23, (8+1)-pole
  - with soldering terminal: 101209970
  - with crimp terminal: 101209994

Note: For color codes of connectors, please refer to the cable datasheet.
Safe switching and monitoring
Non-Contact Safety Sensors

Electronic safety sensors are used to detect guard door closure. These sensors use non-contact operating principles (pulse echo or RFID) that limits wear on components, and tolerates misalignment. A microprocessor provides continuous internal function tests and monitors the safety outputs, meeting PLe to ISO13849-1 and SIL 3 to IEC61508, even when wired in series. Three color LEDs on the sensor indicate status, various errors, and misalignment. For more advanced indication these models are also available with serial diagnostics to connect to commercial field bus systems.

Magnetic safety sensors are of particular advantage in cases where extremely dirty conditions can occur or high hygienic standards need to be maintained. This is provided by the simplicity of cleaning the units.

A further advantage is the facility for concealed mounting under non-magnetic materials. Working surfaces and storage areas can be arranged without the need for dust-collecting edges or other functionally required cut-outs or projections.

These switches are available in a variety of profiles and housing materials, including IP69K rated models.
### Selection tables: safety sensors

#### Electronic Safety Sensors

<table>
<thead>
<tr>
<th>Design</th>
<th>Sensor type</th>
<th>Contacts</th>
<th>Connecting options</th>
<th>Actuator type</th>
<th>Coded</th>
<th>Distance $s_{wz}$ / $s_{uw}$ [mm]</th>
<th>Integrated monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSS 36</td>
<td>-2P+D -2P+SD</td>
<td>ST ST</td>
<td>RST 36-1 RST 36-1-R RST 16-1 RST-U-2</td>
<td>•</td>
<td>10 / 16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RSS 260</td>
<td>-D -SD</td>
<td>Ltg ST  Ltg ST</td>
<td>RST 260-1 RST 16-1 RST-U-2</td>
<td>•</td>
<td>10 / 18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RSS 16</td>
<td>-2P -2P+D</td>
<td>Ltg ST  Ltg ST</td>
<td>RST 16-1 RST-16-1-R</td>
<td>•</td>
<td>12 / 30 5 / 30 (Latching)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSS 30</td>
<td>-2P+D</td>
<td>Ltg</td>
<td>CST 30-1</td>
<td>•</td>
<td>12 / 19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSS 30S / CSS 300</td>
<td>-2P+D -2P+SD</td>
<td>ST ST</td>
<td>CST 30S-1 CST 300-1</td>
<td>•</td>
<td>8 / 15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSS 34</td>
<td>-2P+D -2P+SD</td>
<td>Ltg ST</td>
<td>refer to table page 1-83</td>
<td>•</td>
<td>refer to table page 1-83 (CSS 34F.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSS 180</td>
<td>-2P -2P+D</td>
<td>Ltg ST  Ltg ST</td>
<td>CST 180-1 CST 180-2</td>
<td>•</td>
<td>7 / 10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Coded Magnet Safety Sensors

<table>
<thead>
<tr>
<th>Design</th>
<th>Sensor type</th>
<th>Contacts</th>
<th>Connecting options</th>
<th>Actuator type</th>
<th>Coded</th>
<th>Distance $s_{wz}$ / $s_{uw}$ [mm]</th>
<th>Integrated monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>BNS 260</td>
<td>-02Z(G) -11Z(G) -02/01Z(G) -11/01Z(G)</td>
<td>Ltg ST  Ltg ST  Ltg ST</td>
<td>BPS 260-1 BPS 260-2</td>
<td>•</td>
<td>5 / 15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BNS 36</td>
<td>-02Z(G) -11Z(G) -02/01Z(G) -11/01Z(G)</td>
<td>Ltg ST  Ltg ST  Ltg ST</td>
<td>BPS 36-1 BPS 36-2</td>
<td>•</td>
<td>7 / 17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BNS 333</td>
<td>-01Y SK</td>
<td></td>
<td>BPS 300 BPS 303</td>
<td>•</td>
<td>4 / 14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BNS 303</td>
<td>-11Z(G) -12Z(G) -12Z(G)-2187</td>
<td>Ltg ST  Ltg ST  Ltg</td>
<td>BPS 300 BPS 303</td>
<td>•</td>
<td>5 / 15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BNS 30</td>
<td>-01ZG</td>
<td>Ltg ST</td>
<td>BPS 300 BPS 303</td>
<td>•</td>
<td>5 / 15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Selection tables: safety sensors

#### Increased switching distance

<table>
<thead>
<tr>
<th>Design</th>
<th>Sensor type</th>
<th>Contacts</th>
<th>Connecting options</th>
<th>Actuator type</th>
<th>Coded</th>
<th>Distance $s_{ox}/s_{oy}$ [mm]</th>
<th>Integrated monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Design" /></td>
<td>BNS 40S / BNS 40S-..-C</td>
<td>-12Z(G)</td>
<td>Ltg</td>
<td>BPS 40S-1 BPS 40S-2 BPS 40S-1-C BPS 40S-2-C</td>
<td>•</td>
<td>8 / 18</td>
<td></td>
</tr>
<tr>
<td><img src="image2.png" alt="Design" /></td>
<td>BNS 16</td>
<td>-12Z</td>
<td>SK</td>
<td>BPS 16</td>
<td>•</td>
<td>8 / 18</td>
<td></td>
</tr>
<tr>
<td><img src="image3.png" alt="Design" /></td>
<td>BNS 303 -2211</td>
<td>-11Z(G) -12Z(G)</td>
<td>Ltg, ST Ltg, ST</td>
<td>BPS 300 BPS 303</td>
<td>•</td>
<td>8 / 18</td>
<td></td>
</tr>
<tr>
<td><img src="image4.png" alt="Design" /></td>
<td>BNS 30 -2211</td>
<td>-01ZG</td>
<td>Ltg, ST</td>
<td>BPS 300 BPS 303</td>
<td>•</td>
<td>8 / 18</td>
<td></td>
</tr>
<tr>
<td><img src="image5.png" alt="Design" /></td>
<td>BNS 300 -2211</td>
<td>-01Z(G)</td>
<td>Ltg, ST</td>
<td>BPS 300 BPS 303</td>
<td>•</td>
<td>8 / 18</td>
<td></td>
</tr>
</tbody>
</table>

**Legend:**
- **G** = with LED (option)
- **LtG** = Cable
- **ST** = Plug-in connector
- **SK** = Screw terminals

Technical data and ordering details can be obtained from the following pages.

#### Door-handle with integrated safety switch

<table>
<thead>
<tr>
<th>Design</th>
<th>Sensor type</th>
<th>Contacts</th>
<th>Connecting options</th>
<th>Actuator type</th>
<th>Coded</th>
<th>Distance $s_{ox}/s_{oy}$ [mm]</th>
<th>Integrated monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image6.png" alt="Design" /></td>
<td>BNS-B20</td>
<td>-12ZG</td>
<td>ST</td>
<td>BNS-B20-B01</td>
<td>•</td>
<td>0 / 22</td>
<td></td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: [www.usa.schmersal.net](http://www.usa.schmersal.net)
Electronic safety sensors

Sensor RSS 36

- Thermoplastic enclosure
- 2 short-circuit proof, p-type safety outputs (24 VDC per 250 mA)
- Increased protection against tampering by optional individual coding of safety sensor and actuator
- Optional version with latching available
- Safety and diagnostic signals can be wired in series
- Integral cross-wire, wire breakage and external voltage monitoring of the safety cables up to the control cabinet
- LED status indication
- Integrated M12 connector
- Robust cleaning agent-resistant housing materials and protection class up to IP69K
- AS-Interface Safety at Work available

Actuator RST 36-1

- Thermoplastic enclosure
- Flexible fitting through universal mounting holes

Technical data

Standards: IEC 60947-5-3, IEC 61508, EN ISO 13849-1
Enclosure: Glass fiber reinforced thermoplastic
Mode of operation: RFID
Actuator: RST 36-1, RST 36-1-R
Series-wiring: Unlimited number of components, however safety-dependent; max. 31 components for serial diagnosis
Connection: Integrated connector M12
- Integrated connector: M12, 8-pole, A-coded
Cable length: Max. 30 m
(Cable length and cable section alter the voltage drop depending on the output current)

Switching distances to IEC 60947-5-3:
- Rates switching distance \( S_n \): 12 mm
- Assured switch-on point \( S_{on} \): 10 mm
- Assured switch-off point \( S_{off} \): 16 mm
- Hysteresis: < 2.0 mm
- Repeat accuracy: < 0.5 mm
- Minimum distance between two sensors: 100 mm

Ambient conditions:
- Ambient temperature \( T_u \): -25 °C ... +70 °C
- Storage and transport temperature: -25 °C ... +85 °C
- Protection class: IP65 / IP67 to EN 60529; IP69K to DIN 40050-9
- Resistance to vibration: 10...55 Hz, amplitude 1 mm
- Response to shock: 30 g / 11 ms
- Duration of risk: ≤ 200 ms
- Standby delay: ≤ 5 s

Electrical data:
- Rated operating voltage \( U_e \): 24 VDC -15% / +10% (PELV)
- Rated operating current \( I_e \): 0.6 A
- Lowest operating current \( I_m \): 0.5 mA
- Required rated short-circuit current: 100 A
- Rated insulation voltage \( U_i \): 32 V
- Rated impulse withstand voltage \( U_{imp} \): 800 V
- No-load current \( I_0 \): 35 mA
- Protection class: II
- Overvoltage category: III

Approvals

Certification in combination with safety sensor

Ordering details

RSS 36

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Standard coding</td>
</tr>
<tr>
<td>1I</td>
<td></td>
<td>Individual coding</td>
</tr>
<tr>
<td>1I2</td>
<td></td>
<td>Individual coding, unlimited</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>With diagnostic output</td>
</tr>
<tr>
<td>3D</td>
<td></td>
<td>With serial diagnostic</td>
</tr>
<tr>
<td>3SD</td>
<td></td>
<td>Without latching</td>
</tr>
<tr>
<td>3R</td>
<td></td>
<td>With latching, latching force approx. 18 N</td>
</tr>
</tbody>
</table>

Actuator, sealing kit and tamper-proof screws must be ordered separately.

Additional accessories

- SD Gateway: Page 1-92
- Series-wiring accessories: Page 1-94
- Diagnostic tables: Online
- Suitable safety controllers: Page 5-2

Note

Connection cables

<table>
<thead>
<tr>
<th>M12</th>
<th>8-pole (IP67)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable length 2.5 m</td>
<td>103011411</td>
</tr>
<tr>
<td>Cable length 5 m</td>
<td>103011412</td>
</tr>
<tr>
<td>Cable length 10 m</td>
<td>103011413</td>
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<table>
<thead>
<tr>
<th>M12</th>
<th>8-pole (IP69K)</th>
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</thead>
<tbody>
<tr>
<td>Cable length 5 m</td>
<td>101210560</td>
</tr>
<tr>
<td>Cable length 5 m (angled)</td>
<td>101210561</td>
</tr>
<tr>
<td>Cable length 10 m</td>
<td>103001389</td>
</tr>
</tbody>
</table>
Electronic safety sensors

**Misalignment**

- **Lateral actuation**
  - The axial misalignment (Y) is max. ± 18 mm.
  - The height misalignment (X) is max. ± 8 mm.
  - Latching versions: X ± 5 mm, Y ± 3 mm.
  - The latching force is reduced by misalignment.

- **Actuating curves**
  - The actuating curves (S) represent the typical switching distance of the safety sensor during the approach of the actuator subject to the actuating direction.

**System components**

**Preferred actuating directions:**
- from front or from side

**Coding procedure**

- **Ordering option -1:**
  - During the individual coding, an actuator is taught by a simple routine during the start-up procedure, so that every form of tampering by means of a replacement or substitute actuator is permanently excluded.

- **Ordering option -2:**
  - Teaching the individual coding of an actuator by a simple routine during the start-up procedure (as -1). A protected coding process enables the teaching of a new actuator for service purposes. Previous actuators are overridden and will no longer be recognized. There is a 10 minute delay after teaching in a new actuator before the switch will function again.

**Ordering details**

- Sealing kit ACC RSS 36-SK 101215048
  - for sealing the mounting holes and as spacer (approx. 3 mm) to facilitate the cleaning below the mounting surface (also suitable as tampering protection for the screw fastening)

- Alternate Actuators:
  - Actuator (flat) RST 16-1
  - Actuator (compact) RST-U-2

- Tamperproof screws with unidirectional slots
  - M4x25, 4 pieces 101217746
  - M4x30, 4 pieces 101217747

**Technical data**

- **Degree of pollution:** 3
- **Safety inputs X1/X2:**
  - Rated operating voltage $U_{e1}$: 24 VDC -15% / +10% (PELV to IEC 60204-1)
  - Current consumption per input: 5 mA
- **Safety outputs Y1/Y2:**
  - p-type, short-circuit proof
  - Rated operating current $I_{e1}$: max. 0.25 A
  - Utilization category: AC-12: $U_{e}/I_{e}$: 24V AC/0.25 A
  - DC-13: $U_{e}/I_{e}$: 24V DC/0.25 A
  - Voltage drop: < 1 V
- **Diagnostic output:**
  - p-type, short-circuit proof
  - Rated operating current $I_{e2}$: max. 0.05 A
  - Utilization category: AC-12: $U_{e}/I_{e}$: 24V AC/0.05 A
  - DC-13: $U_{e}/I_{e}$: 24V DC/0.05 A
  - Voltage drop: < 2 V
- **Serial diagnostic:**
  - short-circuit proof
  - Operating current: 150 mA
  - Wiring capacitance for serial diagnostic: max. 50 nF
- **External cable protection:**
  - Fuse - Integrated connector: 2.0 A
  - Connecting cable: 4.0 A

**LED functions:**
- Green: Supply voltage on
- Yellow: Operating status
- Red: Error

**Classification:**

- **Standards:** EN ISO 13849-1, IEC 61508, IEC 62061
- **PL:** e
- **Category:** 4
- **PFH:** $2.7 \times 10^{15}$/h
- **PFD:** $2.1 \times 10^{-5}$
- **SIL:** suitable for SIL 3 applications
- **Mission time:** 20 years

**Note**

- **Requirements for the safety controller**
  - Dual-channel safety input, suitable for p-type sensors with normally-open (NO) function.
  - Internal function tests of the sensors cause the outputs to cyclically switch off for max. 0.25 ms, this must be tolerated by the safety controller. The safety controller must not be equipped with cross-wire detection.
  - Detailed information about the use of the serial diagnostics can be found in the operating instructions of the PROFIBUS-Gateway SD-I-DPV0-2 and the Universal-Gateway SD-I-U-…. and in the instructions for the integration of the SD-Gateway.

**Electronic safety sensors**

**Misalignment**

- **Lateral actuation**
  - The axial misalignment (Y) is max. ± 18 mm.
  - The height misalignment (X) is max. ± 8 mm.
  - Latching versions: X ± 5 mm, Y ± 3 mm.
  - The latching force is reduced by misalignment.

**Actuating curves**

- The actuating curves (S) represent the typical switching distance of the safety sensor during the approach of the actuator subject to the actuating direction.

**System components**

**Preferred actuating directions:**
- from front or from side

**Coding procedure**

- **Ordering option -1:**
  - During the individual coding, an actuator is taught by a simple routine during the start-up procedure, so that every form of tampering by means of a replacement or substitute actuator is permanently excluded.

- **Ordering option -2:**
  - Teaching the individual coding of an actuator by a simple routine during the start-up procedure (as -1). A protected coding process enables the teaching of a new actuator for service purposes. Previous actuators are overridden and will no longer be recognized. There is a 10 minute delay after teaching in a new actuator before the switch will function again.

**Ordering details**

- Sealing kit ACC RSS 36-SK 101215048
  - for sealing the mounting holes and as spacer (approx. 3 mm) to facilitate the cleaning below the mounting surface (also suitable as tampering protection for the screw fastening)

- Alternate Actuators:
  - Actuator (flat) RST 16-1
  - Actuator (compact) RST-U-2

- Tamperproof screws with unidirectional slots
  - M4x25, 4 pieces 101217746
  - M4x30, 4 pieces 101217747

For more information, see our online product catalog: www.usa.schmersal.net
Electronic safety sensors

Sensor RSS 260

- Thermoplastic enclosure
- 2 short-circuit proof, p-type safety outputs (24 VDC per 250 mA)
- Increased protection against tampering by optional individual coding of safety sensor and actuator
- Symmetrical housing offers multiple mounting options
- Safety and diagnostic signals can be wired in series
- Integral cross-wire, wire breakage and external voltage monitoring of the safety cables up to the control cabinet
- LED status indication
- Integrated M8 connector or prewired cable with connector end
- Compact design (40 x 18 x 29.5 mm)
- AS-Interface Safety at Work available

Actuator RST 260

- Thermoplastic enclosure
- Flexible fitting through universal mounting holes

Technical data

Standards: IEC 60947-5-3, IEC 61508, EN ISO 13849-1
Enclosure: thermoplastic PBT
Mode of operation: RFID
Actuator: RST260-1, TSR16-1, RST-U-2
Series-wiring: unlimited number of components, however safety-dependent; max. 31 components for serial diagnosis
Connection: Connector M8, 8-pole, A-coded
Switching distances to IEC 60947-5-3:
- Typical switching distance: 12 mm
- -in case of sidewise actuation: 9 mm
Assured switch-on point S_{on}:
- -in temperature range -10 °C ... +60 °C: 10 mm
- -in case of sidewise actuation: 6 mm
Assured switch-off point S_{off}:
- -in temperature range -25 °C ... +65 °C: 8 mm
- -in case of sidewise actuation: 4 mm
Hysteresis: < 2.0 mm
Repeat accuracy: < 0.5 mm
Minimum distance between two sensors: 100 mm

Ambient conditions:
- Ambient temperature T_{a}:
  -25 °C ... +65 °C
- Storage and transport temperature:
  -25 °C ... +85 °C
Protection class: IP65 / IP67 to EN 60529
Resistance to vibration: 10...55 Hz, amplitude 1 mm
Resistance to shock: 30 g / 11 ms
Switching frequency f: 1 Hz
Response time: ≤ 100 ms
Duration of risk: ≤ 200 ms
Standby delay: ≤ 5 s

Electrical data:
- Rated operating voltage U_{e}:
  24 VDC -15% / +10% (PELV)
- Rated operating current I_{e}:
  0.6 A
- Lowest operating current I_{min}:
  0.5 mA
- Required rated short-circuit current: 100 A
- Rated insulation voltage U_{i}:
  32 V
- Rated impulse withstand voltage U_{imp}:
  800 V
- No-load current I_{0}:
  35 mA
- Overvoltage category: III

Approvals

Certification in combination with safety sensor

Ordering details

RSS 260-(I<sup>1</sup>)-(ST<sup>2</sup>)

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I</td>
<td>Standard coding</td>
</tr>
<tr>
<td>I1</td>
<td></td>
<td>Individual coding</td>
</tr>
<tr>
<td>I2</td>
<td></td>
<td>Individual coding, unlimited</td>
</tr>
<tr>
<td>2</td>
<td>D</td>
<td>With diagnostic output</td>
</tr>
<tr>
<td>SD</td>
<td></td>
<td>With serial diagnostic</td>
</tr>
</tbody>
</table>

Prewired cable with connector end:
RSS 260-D-LSTM12-8-0.25M
RSS 260-I2-D-LSTM12-8-0.25M

Approvals

Ordering details

Actuator

Actuator RST 260-1

Actuator and other system components (cables, sealing kit, mounting kit, tamper-proof screws) must be ordered separately.

Note

Additional information:
- SD Gateway: Page 1-92
- Series-wiring accessories: Page 1-94
- Diagnostic tables: Online
- Suitable safety controllers: Page 5-2

Connector Cable, M8, 8-pole
2 m cable, straight connector
5 m cable, straight connector
10 m cable, straight connector
2 m cable, right angle connector
5 m cable, right angle connector
10 m cable, right angle connector

2 m cable, M8 fem to M12 male
Electronic safety sensors

Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated operating voltage $U_{e1}$</td>
<td>24 VDC -15% / +10% (PELV to IEC 60204-1)</td>
</tr>
<tr>
<td>Current consumption per input</td>
<td>5 mA</td>
</tr>
<tr>
<td>Safety outputs Y1/Y2:</td>
<td>p-type, short-circuit proof</td>
</tr>
<tr>
<td>Rated operating current $I_{e1}$</td>
<td>max. 0.25 A</td>
</tr>
<tr>
<td>Utilization category</td>
<td>DC-12: $U_{e1}/I_{e1}$: 24V AC/0.25 A</td>
</tr>
<tr>
<td></td>
<td>DC-13: $U_{e1}/I_{e1}$: 24V DC/0.25 A</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>$U_e &lt; 1\text{ V}$</td>
</tr>
<tr>
<td>Diagnostic output</td>
<td>p-type, short-circuit proof</td>
</tr>
<tr>
<td>Rated operating current $I_{e2}$</td>
<td>max. 0.05 A</td>
</tr>
<tr>
<td>Utilization category</td>
<td>DC-12: $U_{e2}/I_{e2}$: 24V AC/0.05 A</td>
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<tr>
<td></td>
<td>DC-13: $U_{e2}/I_{e2}$: 24V DC/0.25 A</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>$U_e &lt; 2\text{ V}$</td>
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<tr>
<td>Serial diagnostic</td>
<td>short-circuit proof</td>
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<tr>
<td>Operating current</td>
<td>150 mA</td>
</tr>
<tr>
<td>Wiring capacitance</td>
<td>max. 50 nF</td>
</tr>
<tr>
<td>Device fuse rating</td>
<td>≤ 2 A when used to UL508</td>
</tr>
<tr>
<td>LED functions</td>
<td>Green: Supply voltage on</td>
</tr>
<tr>
<td></td>
<td>Yellow: Operating status</td>
</tr>
<tr>
<td></td>
<td>Red: Error</td>
</tr>
</tbody>
</table>

Classification:

- Standards: EN ISO 13849-1, IEC 61508, IEC 62061
- $PL_e$: 4
- $PFH$: $6.8 \times 10^{-10}/\text{h}$
- $PFD$: $1.2 \times 10^{-4}$
- $SIL$: suitable for SIL 3 applications
- Mission time: 20 years

Note

Requirements for the safety controller

Dual-channel safety input, suitable for p-type sensors with normally-open (NO) function.

The internal function tests of the sensors cause the outputs to cyclically switch off for max. 0.25 ms; this must be tolerated by the safety controller. The safety controller must not be equipped with cross-wire detection.

Detailed information about the use of the serial diagnostics can be found in the operating instructions of the PROFIBUS-Gateway SD-i-DPV0-2 and the Universal-Gateway SD-i-U-..... and in the instructions for the integration of the SD-Gateway.

Coding procedure

Ordering option -11:

During the individual coding, an actuator is taught by a simple routine during the start-up procedure, so that every form of tampering by means of a replacement or substitute actuator is permanently excluded.

Ordering option -12:

Teaching the individual coding of an actuator by a simple routine during the start-up procedure (as -11). A protected coding process enables the teaching of a new actuator for service purposes. Previous actuators are overridden and will no longer be recognized. There is a 10 minute delay after teaching in a new actuator before the switch function again.

System components

Ordering details

- Sealing kit ACC RSS 260-SK 103004733 for sealing the mounting holes
- Mounting set ACC RSS 260-MK 103005469
- Alternate actuators:
  - RST 16-1
  - RST 16-2
- Tamperproof screws with unidirectional slots
  - M4x20, 4 pieces: 103006158
  - M4x25, 4 pieces: 101217746

For more information, see our online product catalog: www.usa.schmersal.net
Electronic safety sensors

Sensor RSS 16

- Thermoplastic enclosure
- 2 short-circuit proof, p-type safety outputs (24 VDC per 250 mA)
- Increased protection against tampering by optional individual coding of safety sensor and actuator
- Safety and diagnostic signals can be wired in series
- Integral cross-wire, wire breakage and external voltage monitoring of the safety cables up to the control cabinet
- LED status indication
- Sensor with screw terminals, cage clamps or with integrated connector (ST)
- Protection class IP65/IP66/IP67
- Three actuating surfaces (front, top, back)
- AS-Interface Safety at Work available

Sensor RSS 16...-R

- Version with magnetic latching
- Latching force: 40 N from front/back
- 60 N from top
- Can be used as a door end stop (up to 5 kg door, traveling at up to 0.35 m/s)

Technical data

Standards: IEC 60947-5-3, EN ISO 13849-1, IEC 61508
Enclosure: glass fiber reinforced thermoplastic
Magnetic latching, anchor and pole plates: Stainless steel 1.4016
Mode of operation: RFID
Actuator: RST 16-1, RST-16-1-R, RST-U-2
Switching distances to IEC 60947-5-3:
Rates switching distance \( S_{on}: \) 15 mm
Assured switch-on distance \( S_{ao}: \) 12 mm
- latching version 5 mm
Assured switch-off distance \( S_{ar}: \) 30 mm
Hysteresis: \( \leq 2.0 \text{ mm} \)
Repeat accuracy \( R: \) \( \leq 0.5 \text{ mm} \)
Series-wiring: Unlimited number of components, please observe external cable protection, max. 31 components for Serial Diagnostics
Cable length: max. 200 m
(Cable length and cable section alter the voltage drop depending on the output current)
Connection: M12, 8-pole Acoded connector
Cage Clamps
Screw Terminals

Connection cables

M12, 8-pole (IP67)
- Cable length 2.5 m
- Cable length 5 m
- Cable length 10 m

Additional Accessories:
- SD Gateway
- Series-wiring accessories
- Diagnostic tables
- Suitable safety controllers

Approvals

Ordering details

RSS 36 ➀-➋-➃

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>➀</td>
<td>I1</td>
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<tr>
<td></td>
<td>I2</td>
<td>Individual coding</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>With diagnostic output</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>With serial diagnostic</td>
</tr>
<tr>
<td></td>
<td>ST8H</td>
<td>With integrated connector M12</td>
</tr>
<tr>
<td></td>
<td>CC</td>
<td>With cage clamps</td>
</tr>
<tr>
<td></td>
<td>SK</td>
<td>With connecting cable 2 m</td>
</tr>
<tr>
<td></td>
<td>ST</td>
<td>With integrated connector M12</td>
</tr>
</tbody>
</table>

Actuator and accessories ordered separately

Latching requires RST16-1-R actuator

Latching requires

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
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<tr>
<td>➀</td>
<td>I1</td>
<td>Standard coding</td>
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<td></td>
<td>D</td>
<td>With diagnostic output</td>
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<td></td>
<td>SD</td>
<td>With serial diagnostic</td>
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<td>ST8H</td>
<td>With integrated connector M12</td>
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<tr>
<td></td>
<td>CC</td>
<td>With cage clamps</td>
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<tr>
<td></td>
<td>SK</td>
<td>With connecting cable 2 m</td>
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<tr>
<td></td>
<td>ST</td>
<td>With integrated connector M12</td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: www.usa.schmersal.net
Technical data

Safety inputs X1/X2:
Rated operating voltage $U_e$: 24 VDC
-15% / +10%
PELV (to IEC 60204-1)
Power consumption per unit: 5 mA
Safety outputs Y1/Y2:
p-type, short-circuit proof
Rated operating current $I_e$: each max. 1 A
Leakage current $I_r$: < 0.5 mA
Utilization category:
DC-12, DC-13: $U_e/I_e$ 24 VDC / 1 A / 55 °C
DC-12, DC-13: $U_e/I_e$ 24 VDC / 0.5 A / 65 °C
DC-12, DC-13: $U_e/I_e$ 24 VDC / 0.25 A / 75 °C
Voltage drop: $U_e < 1 V$
Diagnostic output:
p-type, short-circuit proof
Rated operating current $I_o$: max. 0.05 A
Utilization category: DC-12 $U_e/I_o$ 24 VDC / 0.05 A
DC-13 $U_e/I_o$ 24 VDC / 0.05 A
Voltage drop: $U_e < 2 V$
Serial Diagnostic: short-circuit proof
Operating current: 150 mA
Wiring capacitance: max. 50 nF
Classification:
Standards: EN ISO 13849-1, IEC 61508
PL: e
Category: 4
PFH value: $6.3 \times 10^{-11}$/h
PFD value: $1.1 \times 10^{-5}$
SIL: suitable for SIL 3 applications
Service life: 20 years

Misalignment

Lateral actuation

The axial misalignment (Y) is max. ± 27 mm.
The height misalignment (X) is max. ± 9 mm.
Latching versions X ± 2 mm, Y ± 2 mm.
The latching force is reduced by misalignment.

Actuating curves

The actuating curves (S) represent the typical switching distance of the safety sensor during the approach of the actuator subject to the actuating direction.

Transverse misalignment

Height misalignment

Coding procedure

Ordering option -I1:
During the individual coding, an actuator is taught by a simple routine during the start-up procedure, so that every form of tampering by means of a replacement or substitute actuator is permanently excluded.

Ordering option -I2:
Teaching the individual coding of an actuator by a simple routine during the start-up procedure (as -I1). A protected coding process enables the teaching of a new actuator for service purposes. Previous actuators are overridden and will no longer be recognized. There is a 10 minute delay after teaching in a new actuator before the switch will function again.

System components

Actuator RST 16-1
Actuator RST 16-1-R
Actuator RST-U-2
Tamperproof Screws

Note

Requirements for the safety controller

Dual-channel p-type safety input. The internal function tests of the sensors cause the outputs to cyclically switch off for max. 2 ms, this must be tolerated by the safety controller.

Detailed information about the use of the serial diagnostics can be found in the operating instructions of the PROFIBUS-Gateway SD-I-DPV0-2 and the Universal-Gateway SD-I-U-.... and in the instructions for the integration of the SD-Gateway.

Ordering details

Actuator (standard) RST 16-1
Actuator for latching RST 16-1-R
Actuator (compact) RST-U-2
Tamperproof screws with unidirectional slots
M5x12, 2 pieces 101135338
M5x16, 2 pieces 101135339
M5x20, 2 pieces 101135340
Electronic safety sensors

Sensor CSS 30

- Metal enclosure M30
- 2 short-circuit proof, p-type safety outputs (24 VDC per 500 mA)
- Self-monitored series-wiring of max. 16 sensors for PLe and category 4 to EN ISO 13849-1
- Max. length of the sensor chain 200 m
- Integral cross-wire, wire breakage and external voltage monitoring of the safety outputs

Actuator CST 30-1

- Thermoplastic enclosure

Technical data

Standards: IEC 60947-5-3; EN ISO 13849-1; IEC 61508
Enclosure: nickel-plated brass
Mode of operation: inductive
Actuator: CST 30-1, CST 34-S-3

Switching distances to IEC 60947-5-3:
Rates switching distance $S_{on}$:
- CST 30-1: 15 mm
- CST 34-S-3: 12 mm
Assured switch-on distance $S_{ao}$:
- CST 30-1: 12 mm ($S_{ao}$ min: 1 mm)
- CST 34-S-3: 10 mm
Assured switch-off distance $S_{ar}$:
- CST 30-1: 19 mm
- CST 34-S-3: 16 mm
Hysteresis: max. 2.0 mm
Repeat accuracy $R$: < 1 mm
Switching frequency $f$: 3 Hz
Series-wiring: max. 16 components
Cable length: max. 200 m
(Cable length and cable section alter the voltage drop depending on the output current)
Cable: PVC / LIYY / 7 x 0.25 mm² / UL-Style 2464 / AWG 24 / 2 m

Ambient conditions:
Ambient temperature $T_{a}$:
- for output current ≤ 500 mA / output -25 °C … +55 °C
- for output current ≤ 200 mA / output -25 °C … +65 °C
- for output current ≤ 100 mA / output -25 °C … +70 °C
Storage and transport temperature: -25 °C … +85 °C
Resistance to vibration: 10 … 55 Hz, amplitude 1 mm
Resistance to shock: 30 g / 11 ms
Protection class: IP65 / IP67

Electrical data:
Rated operating voltage $U_{e}$: 24 VDC -15% / +10% (stabilised PELV)
Rated operating current $I_{e}$: 1.1 A
Required rated short-circuit current: 100 A
Short-circuit protection: external fuse
- for output current ≤ 200 mA: 1.0 A
- for output current > 200 mA: 1.6 A

Approvals
- Certification in combination with safety sensor under preparation

Ordering details

CSS 15-30-2P+D-M-L

Actuator

Actuator CST 30-1

Sensor and actuator must be ordered separately!

Approvals

Note
The safety monitoring module must tolerate internal functional tests of the safety outputs for 250 μs ... 1500 μs.

The 250 μs switch-off time of the safety sensor additionally will be extended depending on the cable length and the capacity of the cable used. Typically, a switch-off time of 500 μs is reached with a 100 m connecting cable. The safety monitoring module does not need to have a cross-wire short monitoring function.
Electronic safety sensors

Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$U_i$</td>
<td>32 V</td>
</tr>
<tr>
<td>$U_{imp}$</td>
<td>800 V</td>
</tr>
<tr>
<td>No-load current $I_0$</td>
<td>0.05 A</td>
</tr>
<tr>
<td>Response time</td>
<td>&lt; 30 ms</td>
</tr>
<tr>
<td>Duration of risk</td>
<td>≤ 30 ms</td>
</tr>
<tr>
<td>Protection class</td>
<td>II</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>III</td>
</tr>
<tr>
<td>Degree of pollution</td>
<td>3</td>
</tr>
<tr>
<td>Safety inputs $X1/X2$</td>
<td></td>
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<tr>
<td>Rated operating voltage $U_r$</td>
<td>24 VDC</td>
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<td>(PELV gem. IEC 60204-1)</td>
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<tr>
<td>Rated operating current $I_r$</td>
<td>1 A</td>
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<tr>
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<tr>
<td>NO function, 2-channel, p-type, short-circuit proof</td>
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</tr>
<tr>
<td>Voltage drop</td>
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</tr>
<tr>
<td>Rated operating voltage $U_{op}$</td>
<td>min. $U_r$ - 0.5 V</td>
</tr>
<tr>
<td>Leakage current $I_{leak}$</td>
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<tr>
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<tr>
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<tr>
<td>Utilization category DC-12 $U_e/I_e$</td>
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<td>Diagnostic output</td>
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<tr>
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<td>min. $U_r$ - 4 V</td>
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<tr>
<td>Rated operating current $I_{di}$</td>
<td>max. 0.05 A</td>
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<td>Classification</td>
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<td>Category</td>
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<tr>
<td>PFH value</td>
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<tr>
<td>SIL:</td>
<td>suitable for SIL 3 applications</td>
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<tr>
<td>Mission time</td>
<td>20 years</td>
</tr>
</tbody>
</table>

Misalignment

The actuating curves represent the switch-on and switch-off distances of the CSS 30 safety sensor by the approach of the CST 30-1 actuator.

In case of concealed mounting, the switching distance varies.

System components

Actuator CST 34-S-3

Terminal mounting H 30

Magnetic ball catch CSA-M-1

Note

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Note

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<td>$S_n$</td>
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<tr>
<td>$S_{ao}$</td>
<td>Assured switch-on distance</td>
</tr>
<tr>
<td>$S_{ar}$</td>
<td>Assured switch-off distance</td>
</tr>
</tbody>
</table>

Ordering details

Actuator CST34-S-3
Terminal mounting H30
Magnetic ball catch CSA-M-1
Electronic safety sensors

**Sensor CSS 30S**

- Stainless steel enclosure M30
- Suitable for concealed mounting behind stainless steel
- 2 short-circuit proof, p-type safety outputs (24 VDC per 250 mA)
- Self-monitored series-wiring of max. 31 sensors
- Max. length of the sensor chain 200 m
- Integral cross-wire, wire breakage and external voltage monitoring of the safety outputs
- With integrated connector

**Actuator CST 30S-1**

- Stainless steel enclosure M30

**Technical data**

- **Standards:** IEC 60947-5-3, EN ISO 13849-1, IEC 61508
- **Enclosure:** Stainless steel, 1.4404 to EN 10088
- **Mode of operation:** Inductive
- **Switching distances to IEC 60947-5-3:**
  - Rates switching distance \( S_{\text{r}} \): 11 mm
  - Assured switch-on distance \( S_{\text{a}} \): 8 mm
  - Assured switch-off distance \( S_{\text{ar}} \): 15 mm
  - Hysteresis: \(< 2 \text{ mm} \)
  - Repeat accuracy: \(< 1 \text{ mm} \)
  - Switching frequency \( f \): 3 Hz
- **Design of electrical connection:** M12, 8-pole
- **Series-wiring:** Max. 31 components
- **Fuse:** External, 2 A
- **Cable length:** Max. 200 m
- **Ambient conditions:**
  - Ambient temperature \( T_{\text{a}} \): -25 °C … +65 °C
  - Storage and transport temperature: -25 °C … +85 °C
  - Resistance to vibration: 10 … 55 Hz, amplitude 1 mm
  - Resistance to shock: 30 g / 11 ms
- **Protection class:** IP69K, to DIN 40050-9, IP65, IP67, IP68 to EN 60529
- **Electrical data:**
  - Rated operating voltage \( U_{\text{e}} \): 24 VDC -15% / +10% (stabilised PELV)
  - Rated operating current \( I_{\text{e}} \): 0.6 A
  - No-load current \( I_{\text{0}} \): Max. 0.1 A; average 50 mA
- **Protection class:** II
- **Overvoltage category:** III
- **Degree of pollution:** 3
- **Ump:** 0.8 kV
- **Uc:** 32 V
- **Response time:** < 60 ms
- **Duration of risk:** < 60 ms
- **Safety inputs X1/X2:**
  - Rated operating voltage \( U_{\text{e}} \): 24 VDC -15% / +10% PELV gem. IEC 60204-1
  - Rated operating current \( I_{\text{e}} \): 1 A

**Approvals**

- **TUV**
- **CE**
- **UL**

**Ordering details**

**CSS 31-30S-①-M-ST**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>D</td>
<td>with diagnostic output</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>with serial diagnostic function</td>
</tr>
</tbody>
</table>

Sensor and actuator must be ordered separately!

### Note

**Requirements for the safety controller**

The safety monitoring module must tolerate internal functional tests of the safety outputs for 250 µs ... 1500 µs.

The 250 µs switch-off time of the safety sensor additionally will be extended depending on the cable length and the capacity of the cable used. Typically, a switch-off time of 500 µs is reached with a 100 m connecting cable. The safety monitoring module does not need to have a cross-wire short monitoring function.
Electronic safety sensors

Technical data

Safety outputs Y1/Y2:
- NO function, 2-channel, p-type, short-circuit proof
- Rated operating voltage \( U_{op} \): 24 VDC
- Voltage drop: \(< 1 \text{ V}\)
- Leakage current \( I_{leak} \): \(< 0.5 \text{ mA}\)
- Rated operating current \( I_{op} \): max. 0.25 A
- Minimum operating current \( I_{min} \): 0.5 mA
- Utilization category: DC-12, DC-13
- \( U_{op}/I_{op} \): 24 VDC / 0.25 A
- Required rated short-circuit current: 100 A

Diagnostic output: p-type, short-circuit proof
- Rated operating voltage \( U_{op} \): 24 VDC
- Voltage drop: \(< 5 \text{ V}\)
- Rated operating current \( I_{op} \): max. 0.05 A
- Utilization category: DC-12, DC-13
- \( U_{op}/I_{op} \): 24 VDC / 0.05 A

Serial diagnostic:
- Operating current: 150 mA short-circuit proof
- Wiring capacitance for serial diagnostic: max. 50 nF

Classification:
- Standards: EN ISO 13849-1, IEC 61508
- PL: e
- Category: 4
- PFH value: \(3.6 \times 10^{-9}/\text{h}\)
- SIL: suitable for SIL 3 applications
- Mission time: 20 years

Misalignment

The actuating curves represent the switch-on and switch-off distances of the safety sensor by the approach of the CST 30S-1 actuator.

When the safety sensor is fitted under non-magnetic stainless steel (V4A) or in case of concealed mounting, the switching distance varies.

Legend
- S Switching distance
- V Misalignment
- \(S_{on}\) Switch-on distance
- \(S_{off}\) Switch-off distance (\(S_{on} < S < S_{off}\))
- \(S_h\) Hysteresis area
- \(S_{ao}\) Assured switch-on distance
- \(S_{ar}\) Assured switch-off distance

Note

Detailed information about the use of the serial diagnostics can be found in the operating instructions of the PROFIBUS-Gateway SD-I-DPV0-2 and the Universal-Gateway SD-I-U-... and in the instructions for the integration of the SD-Gateway.

Ordering details

Terminal mounting H 30
Magnetic ball catch CSA-M-1

Connection cables:
- M12, 8-pole (IP67)
  - Cable length 2.5 m: 103011411
  - Cable length 5 m: 103011412
  - Cable length 10 m: 103011413
- M12, 8-pole (IP69K)
  - Cable length 5 m: 101210560
  - Cable length 5 m (angled): 101210561
  - Cable length 10 m: 103001389

Additional Accessories:
- SD Gateway Page 1-92
- Series-wiring accessories Page 1-94
- Diagnostic tables Online
- Suitable safety controllers Page 5-2

Note

For more information, see our online product catalog: www.usa.schmersal.net
Electronic safety sensors

Sensor CSS 300

- Thermoplastic enclosure
- Ø M30
- Suitable for concealed mounting behind stainless steel
- 2 short-circuit proof, p-type safety outputs (24 VDC per 250 mA)
- Self-monitored series-wiring of max. 31 sensors
- Comfortable diagnosis through sensor LED and diagnostic output
- Max. length of the sensor chain 200 m
- Integral cross-wire, wire breakage and external voltage monitoring of the safety outputs
- With integrated connector

Betätiger CST 30S-1

- Stainless steel enclosure
- Ø M30

Technical data

Standards: IEC 60947-5-3, EN ISO 13849-1, IEC 61508
Enclosure: thermoplastic
Mode of operation: inductive
Switching distances to IEC 60947-5-3:
- Rates switching distance S_{on}: 11 mm
- Assured switch-on point S_{on}: 8 mm
- Assured switch-off point S_{off}: 15 mm
- Hysteresis: < 2 mm
- Repeat accuracy: < 1 mm
- Switching frequency f: 3 Hz
- Integrated connector: M12, 8-pole
- Series-wiring: max. 31 components
- Fuse: external, 2 A
- Cable length: max. 200 m

Ambient conditions:
- Ambient temperature T_{a}: -25 °C … +60 °C
- Storage and transport temperature: -25 °C … +85 °C
- Resistance to vibration: 10…55 Hz, amplitude 1 mm
- Resistance to shock: 30 g / 11 ms
- Protection class: IP65, IP67 to EN 60529

Electrical data:
- Rated operating voltage U_{e}: 24 VDC -15% / +10%
  (stabilised PELV)
- Rated operating current I_{e}: 0.6 A
- No-load current I_{0}: max. 0.1 A; average 50 mA
- Protection class: II
- Overvoltage category: III
- Degree of pollution: 3
- Rated impulse withstand voltage U_{imp}: 0.8 kV
- Rated insulation voltage U_{i}: 32 V
- Response time: < 60 ms
- Duration of risk: < 60 ms

Safety inputs X1/X2:
- Rated operating voltage U_{e}: 24 VDC -15% / +10%
  PELV gem. IEC 60204-1
- Rated operating current I_{e}: 1 A

Note

Requirements for the safety controller
The safety monitoring module must tolerate internal functional tests of the safety outputs for 250 μs –1500 μs.

The 250 μs switch-off time of the safety sensor additionally will be extended depending on the cable length and the capacity of the cable used. Typically, a switch-off time of 500 μs is reached with a 100 m connecting cable. The safety monitoring module does not need to have a cross-wire short monitoring function.

Ordering details

CSS 11-300-①-M-ST

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>D</td>
<td>with diagnostic output</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>with serial diagnostic function</td>
</tr>
</tbody>
</table>

Sensor and actuator must be ordered separately!

Approvals

TUV Certification in combination with safety sensor

Ordering details

Actuator CST 30S-1

Requirements for the safety controller
The safety monitoring module must tolerate internal functional tests of the safety outputs for 250 μs –1500 μs.

The 250 μs switch-off time of the safety sensor additionally will be extended depending on the cable length and the capacity of the cable used. Typically, a switch-off time of 500 μs is reached with a 100 m connecting cable. The safety monitoring module does not need to have a cross-wire short monitoring function.

For more information, see our online product catalog: www.usa.schmersal.net
Electronic safety sensors

Technical data

Safety outputs Y1/Y2:
- NO function, 2-channel, p-type, short-circuit proof
- Rated operating voltage Ue1: 24 VDC
- -15% / +10%
- Voltage drop: < 1 V
- Leakage current Ileak: < 0.5 mA
- Rated operating current Ie1: max. 0.25 A
- Minimum operating current Im: 0.5 mA
- Utilization category: DC-12, DC-13
- Ue1/Ie1: 24 VDC / 0.25 A
- Required rated short-circuit current: 100 A

Diagnostic output:
- Rated operating voltage Ue2: 24 VDC
- -15% / +10%
- Voltage drop: < 5 V
- Rated operating current Ie2: max. 0.05 A
- Utilization category: DC-12, DC-13
- Ue2/Ie2: 24 VDC / 0.05 A

Serial diagnostic:
- Operating current: 150 mA short-circuit proof
- Wiring capacitance for serial diagnostic: max. 50 nF

Classification:
- Standards: EN ISO 13849-1, IEC 61508
- PL: e
- Category: 4
- PFH value: 3.6 x 10^-9 /h
- SIL: suitable for SIL 3 applications
- Mission time: 20 years

Misalignment

The actuating curves represent the switch-on and switch-off distances of the safety sensor by the approach of the CST 30S-1 actuator.

If the safety sensor is mounted behind non-ferromagnetic stainless steel (V4A) either flush-mounted, the switching distance is reduced.

System components

Terminal mounting H 30

Magnetic ball catch CSA-M-1

Note

Detailed information about the use of the serial diagnostics can be found in the operating instructions of the PROFIBUS-Gateway SD-I-DPV0-2 and the Universal-Gateway SD-I-U-..... and in the instructions for the integration of the SD-Gateway.

Note

Additional Accessories:
- SD Gateway: Page 1-92
- Series-wiring accessories: Page 1-94
- Diagnostic tables: Online
- Suitable safety monitoring modules: Page 5-2

Ordering details

Terminal mounting: H 30
- Magnetic ball catch: CSA-M-1

Connection cables:
- M12, 8-pole (IP67):
  - Cable length 2.5 m: 103011411
  - Cable length 5 m: 103011412
  - Cable length 10 m: 103011413
- M12, 8-pole (IP69K):
  - Cable length 5 m: 101210560
  - Cable length 5 m (angled): 101210561
  - Cable length 10 m: 103001389

Legend
- S: Switching distance
- V: Misalignment
- Son: Switch-on distance
- Soff: Switch-off distance
- Sh: Hysteresis area Sh = Son - Soff
- Sao: Assured switch-on distance
- Sar: Assured switch-off distance
Electronic safety sensors

Sensor CSS 34

- Thermoplastic enclosure
- 2 short-circuit proof, p-type safety outputs (24 VDC per 250 mA)
- Self-monitored series-wiring of max. 31 sensors
- Max. length of the sensor chain 200 m
- Integral cross-wire, wire breakage and external voltage monitoring of the safety cables up to the control cabinet
- Sensor with connecting cable or with integrated connector

Sensor CSS 34F0/F1

- Additional functions of the CSS 34F0/F1:
  • To control positive-guided relays without downstream safety controller
  • Suitable as individual or end device in series-wired chains of standard sensors to replace the safety controller
  • Self-monitored series-wiring of up to 30 CSS 34 sensors and one CSS 34F sensor
  • CSS 34F. sensor with integrated connector
  - CSS 34F0: without edge monitoring of the enabling button, suitable for automatic start
  - CSS 34F1: with edge monitoring of the reset button

Technical data

Standards:
- IEC 60947-5-3,
- EN ISO 13849-1;
- IEC 61508

Enclosure:
- Glass fiber reinforced thermoplastic

Mode of operation:
- Inductive

Actuator and switching distances (IEC 60947-5-3):
- Refer to table "Actuator / switching distances"

Series-wiring:
- Max. 31 components

Cable length:
- Max. 200 m

Hysteresis:
- Max. 1.5 mm

Repeat accuracy:
- < 0.5 mm

Switching frequency f:
- 3 Hz

Cable:
- Y-UL 2517 / 8 x AWG 22
- 8 x 0.35 mm², 2 m long

Temperature resistance of the cable:
- At rest: -30 °C ... +105 °C
- In movement: -10 °C ... +105 °C

Integrated connector:
- M12, 8-pole in the enclosure

Ambient conditions:
- Ambient temperature T\textsubscript{a}:
  - For output current
    - ≤ 0.1 A/output: -25 °C ... +70 °C
    - ≤ 0.25 A/output: -25 °C ... +65 °C
  - Storage and transport temperature: -25 °C ... +85 °C
  - Resistance to vibration: 10 ... 55 Hz, amplitude 1 mm
  - Resistance to shock: 30 g / 11 ms
  - Protection class: IP65, IP67 to EN 60529

Electrical data:
- Rated operating voltage U\textsubscript{e}:
  - 24 VDC
  - -15% / +10% (stabilised PELV)

Rated operating current I\textsubscript{e}:
- 0.6 A

Required rated short-circuit current:
- 100 A

Fuse (circuit breaker):
- For cables
  - Up to 45°C: 4.0 A
  - Up to 60°C: 3.15 A
  - At 65°C: 2.5 A
  - At 70°C: 2.0 A
  - For connectors: 2.0 A

The cable section of the interconnecting cable must be observed for both wiring variants!

Approvals

Ordering details

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<tr>
<td>② 14</td>
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<td></td>
<td>Sideways actuation</td>
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<tr>
<td>③ S</td>
<td></td>
<td></td>
<td>Lateral actuating surface</td>
</tr>
<tr>
<td>④ V</td>
<td></td>
<td></td>
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<tr>
<td>⑥ SD</td>
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<tr>
<td>⑦ L</td>
<td></td>
<td></td>
<td>With connecting cable</td>
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<tr>
<td>⑧ ST</td>
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<td></td>
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Ordering details

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<th>No.</th>
<th>Option</th>
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<tbody>
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<tr>
<td>⑧ ST</td>
<td></td>
<td></td>
<td>With integrated connector</td>
</tr>
</tbody>
</table>

Note

Requirements for the safety controller
- Dual-channel safety input, suitable for p-type sensors with normally-open (NO) function. The internal function tests of the sensors cause the outputs to cyclically switch off for max. 0.5 ms, this must be tolerated by the safety controller.
- The safety controller must not be equipped with cross-wire detection.

Sensor and actuator must be ordered separately!
Electronic safety sensors

Technical data

- \( U_\text{i} \): 32 V
- \( U_{\text{imp}} \): 800 V
- \( I_\text{o} \): 0.1 A
- Response time: < 30 ms
- Duration of risk: < 60 ms
- Protection class: II
- Overvoltage category: III
- Degree of pollution: 3

Safety inputs X1/X2:
- Rated operating voltage \( U_e \): 24 VDC
- Rated operating current \( I_e \): 1 A

Safety outputs Y1/Y2:
- NO function, 2-channel, p-type, short-circuit proof
- Voltage drop: < 1 V
- Rated operating voltage \( U_e \): min. \((U_e - 1 \text{ V})\)
- Leakage current \( I_r \): < 0.5 mA
- Rated operating current \( I_e \): max. 0.25 A, ambient temperature-dependent
- Minimum operating current \( I_{e,\text{min}} \): 0.5 mA
- Utilization category: DC-12, DC-13
-\( U_e/I_e \): 24 VDC / 0.25A

Diagnostic output:
- p-type, short-circuit proof
- Voltage drop: < 5 V
- Rated operating voltage \( U_e \): min. \((U_e - 5 \text{ V})\)
- Rated operating current \( I_e \): max. 0.05 A
- Utilization category: DC-12, DC-13
-\( U_e/I_e \): 24 VDC / 0.05A

Wiring capacitance for serial diagnostic: max. 50 nF

Classification:
- Standards: EN ISO 13849-1, IEC 61508
- PL: e
- Category: 4
- PFH value: \( 1.3 \times 10^{-10} \text{ h} \)
- SIL: suitable for SIL 3 applications
- Mission time: 20 years

Note

Additional Accessories:
- Actuator: Page 1-86
- SD Gateway: Page 1-92
- Series-wiring accessories: Page 1-94
- Diagnostic tables: Online
- Suitable safety controllers: Page 5-2

Connections

- Connection cables:
  - M12, 8-pole (IP67): 103011411
  - Cable length 2.5 m
  - M12, 8-pole (IP69K): 101210560
  - Cable length 5 m (angled)

Connections cables:
- M12, 8-pole (IP69K):
  - Cable length 5 m: 103011412
  - Cable length 10 m: 103011413
  - Cable length 5 m (angled): 101210561

Note

The long side allows for a max. height misalignment (X) of sensor and actuator of 36 mm (e.g., mounting tolerance or due to guard door sagging).

Increased misalignment, max. 53 mm, possible when the CST 34-S-2 actuator is used. The axial misalignment (Y) is max. ± 10 mm.

The front side allows for a maximum transverse misalignment (Z) of approx. 8 mm.

Misalignment

Sideways actuation

Head actuation

Connections

- Connection cables:
  - M12, 8-pole (IP67): 103011411
  - Cable length 2.5 m

Connections cables:
- M12, 8-pole (IP69K):
  - Cable length 5 m (angled): 101210561

Connections cables:
- M12, 8-pole (IP69K):
  - Cable length 5 m (angled): 101210561
  - Cable length 10 m: 103001389

Connections cables:
- M12, 8-pole (IP69K):
  - Cable length 5 m (angled): 101210561
  - Cable length 10 m: 103001389
Electronic safety sensors

### Actuator

- **Actuator CST-34-..1** and **CST-34-S-2***
  - Sensor CSS 34 and actuator are isometric
  - Head and sideways actuation of the sensor possible

- **Actuator CST-34-S-3***
  - Small design
  - Head and sideways actuation of the sensor possible

- **Actuator CST 180-1***
  - Actuators are isometric, but CST 180-1 incl. H18 clamp
  - Head and sideways actuation of the sensor possible

- **Actuator CST 180-2***

### Ordering details

<table>
<thead>
<tr>
<th>CST 34-1-1</th>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>V</td>
<td>S</td>
<td>Head actuating surface</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sideways actuating surface</td>
</tr>
</tbody>
</table>

Actuator with double solenoid, for increased misalignment, lateral actuating surface **CST 34-S-2***

- Sensor and actuator must be ordered separately!

### Approvals

- H 2735 97,2 101,7

- H 1219 27 2735 ① 4,2
  - Small design
  - Head and sideways actuation of the sensor possible

- Actuators are isometric, but CST 180-1 incl. H18 clamp

### Also suitable:

- Actuator CSS 180
  - with terminal mounting **CST 180-1***
  - without terminal mounting **CST 180-2***

- Certification in combination with safety sensor under preparation
## Electronic safety sensors

### Selection table: Actuator

<table>
<thead>
<tr>
<th>Safety sensor</th>
<th>Actuator</th>
<th>Actuation</th>
<th>Switching distances to IEC 60947-5-3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CST 34-S-1</td>
<td>![Image]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sideways actuation</td>
<td>![Image]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSS 14-34-S</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>![Graph]</td>
</tr>
<tr>
<td>CST 34-S-2</td>
<td>![Image]</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>![Graph]</td>
</tr>
<tr>
<td>CST 34-S-3</td>
<td>![Image]</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>![Graph]</td>
</tr>
<tr>
<td>CST 180-1 / CST 180-2</td>
<td>![Image]</td>
<td></td>
<td>![Graph]</td>
</tr>
<tr>
<td>Head actuation</td>
<td>![Image]</td>
<td></td>
<td>![Graph]</td>
</tr>
<tr>
<td>CSS 12-34-V</td>
<td></td>
<td></td>
<td>![Graph]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>![Graph]</td>
</tr>
<tr>
<td>CST 34-V-1</td>
<td>![Image]</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>![Graph]</td>
</tr>
<tr>
<td>CST 34-S-2</td>
<td>![Image]</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>![Graph]</td>
</tr>
<tr>
<td>CST 34-S-3</td>
<td>![Image]</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>![Graph]</td>
</tr>
<tr>
<td>CST 180-1 / CST 180-2</td>
<td>![Image]</td>
<td></td>
<td>![Graph]</td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: [www.usa.schmersal.net](http://www.usa.schmersal.net)
Electronic safety sensors

CSS 180

- Connecting cable or connecting cable and connector
- Thermoplastic enclosure
- Electronic, non-contact, coded system
- Large switching distance
- Misaligned actuation possible
- High repeat accuracy of the switching points
- Self-monitored series-wiring
- Of max. 16 sensors
- Max. length of the sensor chain 200 m
- Comfortable diagnose through sensor LED and diagnostic output
- Early warning when operating near the limit of the sensor’s hysteresis range
- 2 short-circuit proof, p-type safety outputs (24 VDC per 500 mA)
- EX version available

CSS 180 ST

- Integrated connector
- Multifunction device
- Available: CSS 8-180-2P+D-M-ST

Technical data

Standards: IEC 60947-5-3, EN ISO 13849-1, IEC 61508
Enclosure: glass fiber reinforced thermoplastic
Mode of operation: inductive
Actuator: CST 180-1, CST 180-2
Series-wiring: max. 16 components
Connection: cable or cable with connector M12 or integrated connector M12
Cable section: according to execution: 4 x 0.5 mm², 5 x 0.34 mm², 7 x 0.25 mm²

Switching distances to IEC 60947-5-3:
Rates switching distance \( S_{on} \): 8 mm
Assured switch-on distance \( S_{ao} \): 7 mm
Assured switch-off distance \( S_{ar} \): 10 mm
Hysteresis: \( \leq 0.7 \) mm
Repeat accuracy: \( \leq 0.2 \) mm
Cable length: max. 200 m

(A cable length and cable section alter the voltage drop depending on the output current)

Ambient conditions:
Ambient temperature \( T_{a} \):
- For max. output current
  - \( \leq 500 \) mA /output -25 °C … +55 °C
  - \( \leq 200 \) mA /output -25 °C … +65 °C
  - \( \leq 100 \) mA /output -25 °C … +70 °C
Storage and transport temperature: -25 °C … +85 °C
Protection class: IP65, IP67 to EN 60529
Resistance to vibration: 10…55 Hz, amplitude 1 mm
Resistance to shock: 30 g / 11 ms
Switching frequency \( f \): 3 Hz
Response time: < 30 ms
Duration of risk: ≤ 30 ms

Electrical data:
Rated operating voltage \( U_{e} \): 24 V DC
-15% / +10% (stabilised PELV)
Rated operating current \( I_{e} \): 1 A
Minimum operating current \( I_{m} \): 0.5 mA
Required rated short-circuit current: 100 A
Rated insulation voltage \( U_{i} \): 32 V
Rated impulse withstand voltage \( U_{imp} \): 800 V
No-load current \( I_{0} \): 0.05 A

Approvals

Ordering details

CSS 8-180-1×2-3

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2P</td>
<td>2 p-type safety outputs</td>
</tr>
<tr>
<td></td>
<td>2P+D</td>
<td>2 p-type safety outputs and 1 p-type signal contact (diagnostic)</td>
</tr>
<tr>
<td>2</td>
<td>E</td>
<td>End or single device</td>
</tr>
<tr>
<td></td>
<td>Y</td>
<td>Device for series-wiring</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>Multifunction device</td>
</tr>
<tr>
<td>3</td>
<td>L</td>
<td>Connecting cable</td>
</tr>
<tr>
<td></td>
<td>LST</td>
<td>Connecting cable with connector</td>
</tr>
<tr>
<td></td>
<td>ST</td>
<td>Integrated connector</td>
</tr>
</tbody>
</table>

Note

Sensor and actuator must be ordered separately!
Electronic safety sensors

Technical data

Leakage current I_r: \( \leq 0.5 \text{ mA} \)
Protection class: II
Overvoltage category: III
Degree of pollution: 3
Safety inputs X1/X2:
Rated operating voltage \( U_e \): 24 VDC
Rated operating current \( I_e \): 1 A
Safety outputs Y1/Y2:
- 4-pole: 4 x 0.5 mm²
- 5-pole: 5 x 0.35 mm²

Connection

End or single device: CSS-8-180-2P+…-E-L…
Connecting cable (2 m):
- Cable section
- 4-pole: 4 x 0.5 mm²
- 5-pole: 5 x 0.35 mm²

Series-wiring device: CSS-8-180-2P-Y-L…
Inputs (IN):
- (0.25 m) grey cable
- 4-pole: 4 x 0.5 mm²
Outputs (OUT): (2 m)
- black cable
- 4-pole: 4 x 0.5 mm²

Multifunctional Device: CSS-8-180-2P+D-M…
Connecting cable (2 m)
- Cable section 7-pole:
- 7 x 0.25 mm²

Ordering details

Requirements for the safety controller
Dual-channel p-type safety input. The internal function tests of the sensors cause the outputs to cyclically switch off for max. 2 ms, this must be tolerated by the safety controller.

Additional Accessories:
Series-wiring accessories Page 1-94
Diagnostic tables Online
Suitable safety controllers Page 5-2
Connector cable for ST version Page 1-91

Note

- Series-wiring of sensors:
  A chain of 16 self-monitored CSS 180 safety sensors can be wired in series without loss of PL e and category 4 to EN ISO 13849-1. In this configuration, the redundant output of the first sensor is wired into the input of the next sensor.
- The voltage drop over a long sensor chain should be taken into account when planning cable routing. It depends on several factors, which are operating voltage, cable length and section, ambient temperature, number of series-wired sensors and the input load of the safety controller.
Electronic safety sensors

System components

Actuator CST 180-1

Actuator CST 180-2

Terminal mounting H 18

Magnetic ball catch CSA-M-1

Ordering details

Actuator CST 180-1
Actuator CST 180-2
Terminal mounting H 18
Magnetic ball catch CSA-M-1

Sensor and actuator must be ordered separately!
Electronic safety sensors

Connectors M12, 8-pole for CSS 34, CSS 30S, CSS 300, RSS 36, RSS16

Ordering details

<table>
<thead>
<tr>
<th>Connecting cables with female connector</th>
<th>Function of the safety switchgear</th>
<th>Pin configuration of the integrated connector</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IP67, M12, 8-pole - 8 x 0.23 mm</strong></td>
<td>with conventional diagnostic output</td>
<td>with serial diagnostics</td>
</tr>
<tr>
<td>Cable length 2.5 m</td>
<td>A1</td>
<td>Ue</td>
</tr>
<tr>
<td>Cable length 5 m</td>
<td>X1</td>
<td>Safety input 1</td>
</tr>
<tr>
<td>Cable length 10 m</td>
<td>A2</td>
<td>GND</td>
</tr>
<tr>
<td><strong>IP69K, M12, 8-pole - 8 x 0.21 mm</strong></td>
<td>Y1</td>
<td>Safety output 1</td>
</tr>
<tr>
<td>Cable length 5 m</td>
<td>OUT</td>
<td>Diagnostic output</td>
</tr>
<tr>
<td>Cable length 5 m, angled</td>
<td>X2</td>
<td>Safety input 2</td>
</tr>
<tr>
<td>Cable length 10 m</td>
<td>Y2</td>
<td>Safety output 2</td>
</tr>
<tr>
<td><strong>IN</strong></td>
<td>IN</td>
<td>CSP 34F2: On-site acknowledgment; others: without function</td>
</tr>
<tr>
<td><strong>Cable length 2.5 m</strong></td>
<td>OUT</td>
<td>SD output</td>
</tr>
<tr>
<td><strong>Cable length 5 m</strong></td>
<td>IN</td>
<td>SD input</td>
</tr>
<tr>
<td><strong>Cable length 10 m</strong></td>
<td><strong>IN</strong></td>
<td><strong>SD input</strong></td>
</tr>
<tr>
<td><strong>Cable length 5 m, angled</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Connectors M12, 8-pole for CSS 30, CSS 180

Ordering details

<table>
<thead>
<tr>
<th>Connecting cables with female connector</th>
<th>Function of the safety switchgear</th>
<th>Pin configuration of the integrated connector</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>Cable length 5 m</td>
<td>X1</td>
<td>Safety input 1</td>
</tr>
<tr>
<td>Cable length 10 m</td>
<td>A2</td>
<td>GND</td>
</tr>
<tr>
<td><strong>IP69K, M12, 8-pole - 8 x 0.21 mm</strong></td>
<td>Y1</td>
<td>Safety output 1</td>
</tr>
<tr>
<td>Cable length 5 m</td>
<td>OUT</td>
<td>Diagnostic output</td>
</tr>
<tr>
<td>Cable length 5 m, angled</td>
<td>X2</td>
<td>Safety input 2</td>
</tr>
<tr>
<td>Cable length 10 m</td>
<td>Y2</td>
<td>Safety output 2</td>
</tr>
<tr>
<td><strong>IN</strong></td>
<td>IN</td>
<td>without function</td>
</tr>
<tr>
<td><strong>Cable length 2.5 m</strong></td>
<td>OUT</td>
<td>SD output</td>
</tr>
<tr>
<td><strong>Cable length 5 m</strong></td>
<td>IN</td>
<td>SD input</td>
</tr>
<tr>
<td><strong>Cable length 10 m</strong></td>
<td><strong>IN</strong></td>
<td><strong>SD input</strong></td>
</tr>
</tbody>
</table>
Electronic safety sensor accessories

**SD-I-DP-V0-2**

**Technical data**

- **PROFIBUS interface:** 9-pole D-SUB connector
  - standard PROFIBUS connection (DP-A, DP-B, 5V, GND)
- **Protocol:** PROFIBUS-DP –V0 upwards compatible
- **Transmission rate:** 9.6 kilo baud … 12 mega baud
- **GSD file:** KAS_0b13.GSD
- **Short-circuit protection:** internal fuse to EN 60127
  - PolySwitch 0.5 A / 60 V
- **LED indications:** refer to table below
- **DIP-switch 8-pole:**
  - S1 … S7: addressing as PROFIBUS slave;
  - S8: automatic addressing of the serial participants
- **Rated operating voltage** $U_e$: 24 VDC, –15 % / +20 %
- **Rated operating current** $I_e$: typically 180 mA, max. 250 mA
- **Rated insulation voltage** $U_i$: 32 V
- **Rated impulse withstand voltage** $U$: 0.5 kV
- **Overvoltage category:** II
- **Degree of pollution:** 2
- **Storage temperature range:** -25 °C … +85 °C, non-condensing
- **Operating temperature range:** -5 °C … +55 °C, non-condensing
- **Relative humidity:** 5% - 95%, non-condensing
- **Protection class:** IP10
- **Resistance to vibration:**
  - 5 … 9 Hz / 3.5 mm (to IEC 60068-2-6)
  - 9 … 150 Hz / 1 g
- **Resistance to shock:** 15 g / 11 ms (to IEC 60068-2-27)
- **EMC rating:**
  - to EN 61000-6-2 (2002)
  - to EN 61000-4-3 (surge): 500 V DC supply / 1 kV PROFIBUS & SD-Interface
- **Industrial interfering radiation:** 37 dBÌV/m
- **Electrical connection:**
  - SD: connection for max. 31 devices in the serial diagnostic
  - - 24 V:
    - + 24 VDC voltage supply
    - GND of the voltage supply and GND of the diagnostic cable and 24 VDC supply, approx. 300 mA, PELV power supply
  - - 0 V:

**Approvals**

**Ordering details**

**SD-I-DP-V0-2**

**Wiring diagram**

Legend:
1. Safety monitoring module
2. Gateway SD
3. PROFIBUS DP
4. PLC with PROFIBUS DP interface
Electronic safety sensor accessories

SD-I-U- ...

- UNIVERSAL-Gateway for the series-wiring of the diagnostic signals from safety switching components with integrated SD interface. Comprehensive status and diagnostic data from the SD components are transmitted to the control system through the field bus interface.
- Diagnostic lines of max. 31 safety switching components can be wired in series
- Series-wiring of different components enabled (CSS 34, RSS 36, AZM 200, MZM 100 etc.)
- Reduced wiring expenditure through the series-wiring of the safety channels and the diagnostic lines in the field
- Automatic addressing of the safety switching components in the SD interface
- IP20 component for quick-fix mounting onto standard DIN rails in the control cabinet

Available FIELD BUS interfaces:
- PROFINET IO
- EtherNet IP
- DeviceNet
- CC-Link
- CANopen
- Modbus/TCP
- EtherCAT

Technical data

Operating voltage: 24 VDC -15 %/+20 % (stabilised PELV)
Fuse rating: external fuse 1 A slow-blow
Operating current at 24 VDC: max. 500 mA, internally protected
Operating temperature range: 0 … 55 °C, in case of vertical positioning
Storage temperature range: -25 °C … +70 °C
Climatic stress: relative humidity 30 % … 85 %, non-condensing
Protection class: IP20
Mounting location: earthed lockable control cabinet with at least IP54 protection class
Resistance to vibrations: if fitted between two lateral clamping blocks on the rail
10 … 57 Hz / 0.35 mm
and 57 … 150 Hz / 5 g
Resistance to shock to IEC 60068-2-6:
10 g
EMC rating:
to EN 61000-4-2 (ESD) ±6 kV contact discharge / ±8 kV Air discharge
to EN 61000-4-3 (HF field) 10 V/m / 80 % AM
to EN 61000-4-4 (Burst) ±1 kV all connections
to EN 61000-4-5 (Surge) ±1 kV all connections
to EN 61000-4-6 (HF cables) 10 V all connections
EMC interfering radiation:
to EN 61000-6-4 (2002) industrial interfering radiation
Rated insulation voltage Ui: 32 V
Rated impulse withstand voltage Uimp: 0.5 kV
Overvoltage category: II
Degree of pollution: 2
Dimensions (W x H x D): 50 x 100 x 80 mm (= mounting height starting from rail)

Approvals

Ordering details

SD-I-U-①
<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PN</td>
<td>PROFINET IO</td>
<td></td>
</tr>
<tr>
<td>EIP</td>
<td>EtherNet IP</td>
<td></td>
</tr>
<tr>
<td>DN</td>
<td>DeviceNet</td>
<td></td>
</tr>
<tr>
<td>CCL</td>
<td>CC-Link</td>
<td></td>
</tr>
<tr>
<td>CAN</td>
<td>CANopen</td>
<td></td>
</tr>
<tr>
<td>MT</td>
<td>Modbus/TCP</td>
<td></td>
</tr>
<tr>
<td>EC</td>
<td>EtherCAT</td>
<td></td>
</tr>
</tbody>
</table>

Wiring diagram

Legend
① Safety monitoring module
② Gateway SD
③ Fieldbus
④ PLC with fieldbus interface

Sensor X1 (IN) X1 (IN) X1 (IN) Y1 (OUT) Y1 (OUT) Y1 (OUT)
Sensor X2 (IN) X2 (IN) X2 (IN) Y2 (OUT) Y2 (OUT) Y2 (OUT)
Sensor Y1 (OUT) Y1 (OUT) Y1 (OUT) Y2 (OUT) Y2 (OUT) Y2 (OUT)
Sensor

For more information, see our online product catalog: www.usa.schmersal.net
Electronic safety sensor accessories

**T-adapter CSS-T**

- Enables the series-wiring of safety sensors. To this end, both the safety channels and the serial diagnostic cable are wired in series.
- For the wiring, M12 cable extensions can be used. The voltage drop (due to the cable length, cable section, voltage drop per sensor) should be taken into account, as it reduces the maximum number of safety sensors that can be wired in series.

**Terminal connector**

- Supplies the safety channels with operating voltage

**Technical data**

<table>
<thead>
<tr>
<th>Rated operating voltage of the SD devices to be connected:</th>
<th>24 V (–15%/+10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated operating current of the SD devices to be connected:</td>
<td>0.6 A</td>
</tr>
<tr>
<td>Fuse of the connecting cables (circuit breaker):</td>
<td>2 A</td>
</tr>
<tr>
<td>Ambient temperature $T_u$:</td>
<td>-25 °C … +70 °C</td>
</tr>
</tbody>
</table>

**Approvals**

| Sensor chain to safety controller |

**Ordering details**

- T-adapter
  - CSS-T

**Wiring diagram**

- CSS-14-34-S-SD-M-ST
- CSS-TCSS-TCSS-T-A

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Electronic safety sensor accessories

### Y-adapter CSS-Y-8P

![Y-adapter CSS-Y-8P diagram]

- Enables the series-wiring of sensors and solenoid interlocks with SD interface. To that effect, both the safety channels and the serial diagnostic lines are wired in series.
- For the wiring, M12 cable extensions can be used. The voltage drop (due to the cable length, cable section, voltage drop per sensor) should be taken into account, as it reduces the maximum number of safety sensors and interlocks with SD interface that can be wired in series.

### Terminal connector

![Terminal connector diagram]

- Supplies the safety channels with operating voltage
- Leads the SD interface back to the control cabinet to connect further SD participants of other safety circuits

### Technical data

- Rated operating voltage of the SD devices: 24 VDC (-15%/+10%)
- Rated operating voltage of the adapter: 30 VDC
- Max. operating current of the device to be connected: 1 A
- Fuse of the connecting cables (circuit breaker): 4 A
- Ambient temperature $T_{\text{a}}$: -25 °C ... +75 °C

### Ordering details

- **Y-adapter**
  - CSS-Y-8P
- **Terminal connector**
  - CSS-Y-A-8P
- Connection cables
  - M12, 8-poles
  - With 0.5m cable: 101217786
  - With 1m cable: 101217787
  - With 1.5m cable: 101217788
  - With 2.5m cable: 101217789
  - With 5m cable: 101217790

### Approvals

- CE

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## Electronic safety sensor accessories

### SD-2V-F-SK
- For field applications, junction box for 2 components, with screw terminals
- The terminals of the junction box are located in a closed enclosure

### SD-2V-S-SK
- For control cabinet mounting, junction box for 2 components, with screw terminals
- Enables wiring in the control cabinet onto standard DIN rails

### Technical data:
- **Standards:** VDE 0100
- **Rated operating voltage** $U_e$: 24 VDC
- **Protection class:** IP00 to EN 60529
- **Ambient temperature:** -25 °C … +70 °C
- **Storage temperature:** -25 °C … +85 °C

### Approvals

### Ordering details
- SD junction box for field applications
  - SD-2V-F-SK

### PDM
- **Passive Distribution Module**
  - Installation in a switching cabinet or in terminal boxes
  - Mixed series connection of 1–4 electronic safety sensors or solenoid interlocks
  - Several modules can be switched in series for more comprehensive safety functions
  - Individual protection of safety switchgear for every device connection with auto-reset fuses
  - Can be configured easily via DIP switches
  - Individual diagnosis and actuation of connected safety switchgear
- Wiring via spring-type terminals suitable for 0.25 – 1.5 mm² / 10 A
- Compact design with a width of only 45 mm on the profile rail
- Versions available for parallel IO wiring and for SD interface

### Technical data:
- **Standards:** IEC 60947-1
- **Rated operating voltage** $U_e$: 24 VDC
- **Protection class:** IP00 to EN 60529
- **Ambient temperature:** -25 °C … +65 °C
- **Storage temperature:** -40 °C … +85 °C

### Approvals

### Ordering details
- IO Wiring
  - PDM-IOP-4CC-IOP
- Serial diagnostic
  - PDM-SD-4CC-SD
Electronic safety sensor accessories

PFB

Passive Fieldbox
- Heavy duty IP67 version
- Mixed series connection of 1–4 electronic safety sensors or solenoid interlocks with 8-pin M12 connector
- Several fieldboxes can be connected in series for more comprehensive safety functions
- Individual protection of safety switchgear for every device connection with auto-reset fuses
- Can be configured easily via DIP switches
- Individual diagnosis and actuation of connected safety switchgear
- Voltage supply via new M12 power plug with cross section of 1.5 mm² / 10 A
- Compact fieldbox with dimensions 63 x 156 mm
- Versions available for parallel IO wiring and SD interface

Technical data:
- Standards: IEC 60947-1
- Rated operating voltage Ue: 24 VDC
- Protection class: IP67 to EN 60529
- Ambient temperature: -20 °C … +65 ºC
- Storage temperature: -40 °C … +70 ºC

Ordering details

<table>
<thead>
<tr>
<th>IO Wiring</th>
<th>PFB-IOP-4M12-IOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial diagnostic</td>
<td>PFB-SD-4M12-SD</td>
</tr>
</tbody>
</table>

Wiring Diagrams

Connection of PFB-IOP

Connection of PFB-SD

For more information, see our online product catalog: www.usa.schmersal.net
Coded magnet safety sensors

BNS 260

- Thermoplastic enclosure
- Coded
- Actuation only possible with BPS 260
- Small design
- Long life, no mechanical wear
- Protection class IP67
- Insensitive to lateral misalignment
- Concealed mounting possible
- Insensitive to soiling
- AS-Interface Safety at Work available

Technical data

- Standards: IEC 60947-5-3, BG-GS-ET-14
- Design: rectangular
- Enclosure: glass fiber reinforced thermoplastic
- Protection class: IP67 to EN 60529
- Connection: Boflex cable or connector M8
- Cable section of cable: 4 x 0.25 mm²
  - with signalling contact: 6 x 0.25 mm²
- Cable section of connector:
  - M8, 4-pole
  - M8, 6-pole
- Mode of operation: magnetic
- Actuating magnet: BPS 260, coded
- Switching voltage:
  - without LED: max. 75 VDC
  - with LED: max. 24 VDC
  - with connector, 6 poles: max. 30 VDC
- Switching current:
  - without LED: max. 400 mA
  - with LED: max. 10 mA
- Switching capacity:
  - without LED: max. 10 VA
  - with LED: max. 240 mW
- Signalling contact: S11-S12
  - S13-S14
- Safety contacts:
  - S11-S12
  - S13-S14
- Ambient temperature: -25 °C ... +70 °C
- Storage and transport temperature: -25 °C ... +70 °C
- Switching frequency: max. 5 Hz
- Resistance to shock: 30 g / 11 ms
- Resistance to vibration: 10 ... 55Hz, amplitude 1 mm

Classification:
- Standards: EN ISO 13849-1
- B10d (NC/NO): 25.000.000 for 20% contact load
- Mission time: 20 years

Contact variants

- BNS 260-02Z(G)
  - BK S11
  - WH S21
  - S12 BU(3)(1) (4)
  - S22 BN

- BNS 260-11Z(G)
  - BK S13
  - WH S21
  - S14 PK(3)(1)(5)
  - S22 YE

- BNS 260-02/01Z(G)
  - GY S11
  - WH S31
  - GN S21
  - S12 PK(3)(1)(5)
  - S22 YES32 BN

- BNS 260-11/01Z(G)
  - GY S13
  - WH S31
  - GN S21
  - S14 PK(3)(1)(5)
  - S22 YE

Approvals

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
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<td>2</td>
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<td>/01</td>
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<tr>
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<td>G</td>
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<td>5</td>
<td>L</td>
<td>Left hand door</td>
</tr>
<tr>
<td>6</td>
<td>R</td>
<td>Right hand door</td>
</tr>
</tbody>
</table>

Note

The actuating magnet must be ordered separately.

Important Note:
Series BNS sensors are only for use in safety applications when used with an electrically compatible safety controller or safety PLC (See section 5 for appropriate safety controllers)

Contact symbols shown for the closed condition of the guard device.

The number in brackets indicate the pin number of the connector.

The contact configuration for versions with or without LED is identical.

Contacts S21-S22 must be integrated in the safety circuit.

The LED is illuminated when the guard door is closed.
### Coded magnet safety sensors

#### System components

<table>
<thead>
<tr>
<th></th>
<th>Left hand door</th>
<th>Right hand door</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Diagram" /></td>
<td><img src="image2.png" alt="Diagram" /></td>
<td><img src="image3.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>

- **Left hand door**
- **Right hand door**
- **BPS 260**
- **Spacer BNS 260**

#### Ordering details

<table>
<thead>
<tr>
<th>Left hand door</th>
<th>Ordering suffix -L</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Right hand door</th>
<th>Ordering suffix -R</th>
</tr>
</thead>
</table>

- **Actuating magnet**
  - Actuator and sensor mounted on same fixing plane: **BPS 260-1**
  - Actuator for 90° fixing: **BPS 260-2**
  - Spacer BNS 260: **101154643**

- **Cable with connector M8, 6-pole**
  - with snap fitting, PVC
  - with cable 2 m: **101206010**
  - with cable 5 m: **101206011**
  - with cable 10 m: **101206012**
  - with cable 2 m (angled): **101206013**
  - with cable 5 m (angled): **101206014**
  - with cable 10 m (angled): **101206015**

- **Cable with connector M8, 4-pole**
  - with screw terminal, PUR
  - with cable 2 m: **101209947**
  - with cable 5 m: **101209981**
  - with cable 2 m (angled): **101210557**
  - with cable 5 m (angled): **101210559**

- **Y-adapter for BNS**
  - with 1 NC/1 NO: **BNS-Y-11**
  - with 2 NC: **BNS-Y-02**

---

*For more information, see our online product catalog: [www.usa.schmersal.net](http://www.usa.schmersal.net)*
Coded magnet safety sensors

**BNS 40S**

- Fully encapsulated stainless steel enclosure
- Coded
- Rectangular design
- Long life, no mechanical wear
- Protection class IP69K
- Actuation only possible with BPS 40S-…
- Insensitive to lateral misalignment
- Concealed mounting possible
- Insensitive to soiling
- Suitable for food-processing industry
- Food-safe connecting cable

**BNS 40S-….C**

- Concealed threaded holes on the rear-side provide for smooth cleaning

**Technical data**

- Standards: IEC 60947-5-3, BG-GS-ET-14
- Design: rectangular
- Enclosure: Stainless steel V4A (Material designation to DIN 1.3960)
- Protection class: IP69K to IEC/EN 60529
- Connection: cable LiYY, 1 m (suitable for the food industry)
- Cable section: 6 x 0.25 mm²
- Mode of operation: magnetic
- Actuating magnet: BPS 40S-1, BPS 40S-2, BPS 40S-1-C, BPS 40S-2-C, coded
- S_{w} = 8 mm
- S_{a} = 18 mm
- Switching conditions indicator: LED only for ordering suffix G

**Approvals**

- * under preparation

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>G</td>
<td>without LED with LED</td>
</tr>
</tbody>
</table>

The actuating magnet must be ordered separately.

**Approvals**

- * under preparation

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>G</td>
<td>without LED with LED</td>
</tr>
</tbody>
</table>

The actuating magnet must be ordered separately.

**Note**

Important Note:
Series BNS sensors are only for use in safety applications when used with an electrically compatible safety controller or safety PLC (See section 5 for appropriate safety controllers)
## Coded magnet safety sensors

### Contact variants

<table>
<thead>
<tr>
<th>Contact variants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO / 2 NC</td>
</tr>
<tr>
<td>GY S13 PK</td>
</tr>
<tr>
<td>GN S21 YE</td>
</tr>
<tr>
<td>WH S31 BN</td>
</tr>
</tbody>
</table>

### System components

<table>
<thead>
<tr>
<th>System components</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPS 40S-1</td>
</tr>
<tr>
<td>BPS 40S-2</td>
</tr>
</tbody>
</table>

### System components

<table>
<thead>
<tr>
<th>System components</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPS 40S-1-C</td>
</tr>
<tr>
<td>BPS 40S-2-C</td>
</tr>
</tbody>
</table>

### Ordering details

<table>
<thead>
<tr>
<th>Ordering details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully encapsulated stainless steel enclosure:</td>
</tr>
<tr>
<td>Actuator and sensor mounted on same fixing plane</td>
</tr>
<tr>
<td>Actuator for 90° fixing</td>
</tr>
<tr>
<td>BPS 40S-1</td>
</tr>
<tr>
<td>BPS 40S-2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ordering details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully encapsulated stainless steel enclosure:</td>
</tr>
<tr>
<td>Actuator and sensor mounted on same fixing plane, rear-side threaded holes</td>
</tr>
<tr>
<td>Actuator for 90° fixing, rear-side threaded holes</td>
</tr>
<tr>
<td>BPS 40S-1-C</td>
</tr>
<tr>
<td>BPS 40S-2-C</td>
</tr>
</tbody>
</table>

### Note

- Contact symbols shown for the closed condition of the guard device.
- The contact configuration for versions with or without LED is identical.
- Contacts S21-S22 must be integrated in the safety circuit.
- The LED is illuminated when the guard door is closed.
Coded magnet safety sensors

BNS 36

- Thermoplastic enclosure
- Coded
- Actuation only possible with BPS 36
- Long life, no mechanical wear
- Protection class IP67
- Insensitive to lateral misalignment
- Concealed mounting possible
- Insensitive to soiling
- AS-Interface Safety at Work available

Technical data

- Standards: IEC 60947-5-3; BG-GS-ET-14
- Design: rectangular
- Enclosure: glass fiber reinforced thermoplastic
- Protection class: IP67 to EN 60529
- Connection: cable LiYY or connector M8
- Cable section of cable: 4 x 0.25 mm²
- Cable section of connector: M8, 4-pole
- Mode of operation: magnetic
- Actuating magnet: BPS 36, coded
- Switching conditions indicator: LED only for ordering suffix G
- Switching voltage
  - without LED: max. 75 VDC
  - with LED: max. 24 VDC
  - with connector, 6 poles: max. 30 VDC
- Switching current
  - without LED: max. 400 mA
  - with LED: max. 10 mA
- Switching capacity
  - without LED: max. 10 VA
  - with LED: max. 240 mW
- Signalling contact: S31-S32
- Safety contacts: S21-S22; S11-S12 bzw. S13-S14
- Ambient temperature: -25 °C … +70 °C
- Storage and transport temperature: -25 °C … +70 °C
- Switching frequency: max. 5 Hz
- Resistance to shock: 30 g / 11 ms
- Resistance to vibration: 10 ... 55 Hz,
  amplitude 1 mm

Classification:

- Standards: EN ISO 13849-1
- B10d (NC/NO): 25.000.000
  for 20% contact load
- Mission time: 20 years

Approvals

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>1 NO / 1 NC</td>
<td>Safety contacts:</td>
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<tr>
<td>02</td>
<td>2 NC</td>
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</tr>
<tr>
<td>/01</td>
<td>1 NC</td>
<td>Signalling contact:</td>
</tr>
<tr>
<td>/10</td>
<td>1 NO</td>
<td>No signalling contact</td>
</tr>
<tr>
<td>3</td>
<td>G</td>
<td>Without LED</td>
</tr>
<tr>
<td>4</td>
<td>ST</td>
<td>With LED</td>
</tr>
<tr>
<td>5</td>
<td>L</td>
<td>With integrated connector</td>
</tr>
<tr>
<td>5</td>
<td>R</td>
<td>Left hand door</td>
</tr>
</tbody>
</table>

Note

The actuating magnet must be ordered separately.

Important Note:

Series BNS sensors are only for use in safety applications when used with an electrically compatible safety controller or safety PLC
(See section 5 for appropriate safety controllers)

Contact symbols shown for the closed condition of the guard device.

Note

The number in brackets indicate the pin number of the connector.

The LED is illuminated when the guard door is closed.

Contacts S21-S22 must be integrated in the safety circuit.
Coded magnet safety sensors

**System components**

**Left hand door**

**Right hand door**

- **Y-adapter**
- **Cable with connector M8**

**Connector M8**

<table>
<thead>
<tr>
<th>4-pole</th>
<th>6-pole</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIN 1: BN</td>
<td>PIN 1: GN</td>
</tr>
<tr>
<td>PIN 2: WH</td>
<td>PIN 2: YE</td>
</tr>
<tr>
<td>PIN 3: BU</td>
<td>PIN 3: GY</td>
</tr>
<tr>
<td>PIN 4: BK</td>
<td>PIN 4: PK</td>
</tr>
<tr>
<td>PIN 5: WH</td>
<td>PIN 6: BN</td>
</tr>
</tbody>
</table>

**System components**

- **BNS Y-11**
- **BNS Y-02**

**Ordering details**

- **Left hand door**
  - Ordering suffix -L
- **Right hand door**
  - Ordering suffix -R

**Actuating magnet**

- Actuator and sensor mounted on same fixing plane: BPS 36-1
- Actuator for 90° fixing: BPS 36-2

**BNS36 Spacer**

**Ordering details**

- **Cable with connector M8, 6-pole**
  - with snap fitting, PVC
  - with cable 2 m: 101206010
  - with cable 5 m: 101206011
  - with cable 10 m: 101206012
  - with cable 2 m (angled): 101206013
  - with cable 5 m (angled): 101206014
  - with cable 10 m (angled): 101206015

- **Cable with connector M8, 4-pole**
  - with screw terminal, PUR
  - with cable 2 m: 101209947
  - with cable 5 m: 101209981
  - with cable 2 m (angled): 101210557
  - with cable 5 m (angled): 101210559

**Ordering details**

- **Y-adapter for BNS**
  - with 1 NC/1 NO: BNS-Y-11
  - with 2 NC: BNS-Y-02
Coded magnet safety sensors

**BNS 16**

- Thermoplastic enclosure
- Coded
- Long life, no mechanical wear
- Protection class IP67/IP69K
- Insensitive to lateral misalignment
- Concealed mounting possible
- Insensitive to soiling
- Wiring compartment
- Suitable for food processing industry
- Mounting dimensions identical to AZ 16
- 3 cable entries M20
- Screw terminals or connector
- AS-Interface Safety at Work available

**BNS 16 LR**

- Actuation from both sides
- Fit for double guards
- Protection against defeat
- Suitable for use with SRB / AES safety monitoring modules
- Screw terminals

**Technical data**

- **Standards:** IEC 60947-5-3, BG-GS-ET-14
- **Design:** Rectangular
- **Enclosure:** Glass fiber reinforced thermoplastic, self-extinguishing
- **Protection class:** IP67 to EN 60529, IP69K to DIN 40050-9
- **Connection:** Screw terminals or connector M12, 4- or 8-pole
- **Cable section:** max. 2 x 1.5 mm² (incl. conductor ferrules)
- **Cable entry:** 3 x M20
- **Mode of operation:** Magnetic
- **Actuating magnet:** BPS 16, coded
- **S_ao:** 8 mm
- **S_ar:** 18 mm
- **Switching voltage:** max. 100 VAC/DC
- **Switching current:** max. 400 mA
- **Switching capacity:** max. 10 W
- **Ambient temperature:** -25 °C … +70 °C
- **Storage and transport temperature:** -25 °C … +70 °C
- **Switching frequency:** max. 5 Hz
- **Resistance to shock:** 30 g / 11 ms
- **Resistance to vibration:** 10 … 55Hz, amplitude 1 mm
- **Classification:** EN ISO 13849-1 B10d
- **Mission time:** 20 years
- **MTTF:** \( \frac{B_{10d}}{0.1 \times n_{op}} \frac{d_{op} \times h_{max} \times 3600}{t_{cycle}} \)

**Approvals**

- UL
- CE

**Ordering details**

**BNS 16-12Z-LR**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>1 NO / 2 NC</td>
<td>Actuating plane: left / right</td>
</tr>
<tr>
<td></td>
<td>LR</td>
<td></td>
</tr>
</tbody>
</table>

The actuating magnets must be ordered separately.

Requires 2 actuators BPS 16

**Important Note:**

Series BNS sensors are only for use in safety applications when used with an electrically compatible safety controller or safety PLC.

See section 5 for appropriate safety controllers.

---

For more information, see our online product catalog: www.usa.schmersal.net
## Coded magnet safety sensors

### Contact variants

<table>
<thead>
<tr>
<th>1 NO / 1 NC</th>
<th>1 NO / 2 NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>S13 —— S14</td>
<td>S13 —— S14</td>
</tr>
<tr>
<td>S21 —— S22</td>
<td>S23 —— S22</td>
</tr>
<tr>
<td>S31 —— S22</td>
<td>S31 —— S32</td>
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</tbody>
</table>

### System components

- **BPS 16**

### Connector

### Ordering details

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuating magnet</td>
<td>BPS 16</td>
</tr>
<tr>
<td>Connector M12, 4-pole</td>
<td>101209950</td>
</tr>
<tr>
<td>without cable</td>
<td></td>
</tr>
<tr>
<td>with cable 5 m</td>
<td>101208523</td>
</tr>
<tr>
<td>Connector M12, 8-pole</td>
<td>101209967</td>
</tr>
<tr>
<td>with cable 5 m</td>
<td></td>
</tr>
</tbody>
</table>

## Note

5 different directions of actuation: cover, front and below, right and left

Contact symbols shown for the closed condition of the guard device.
### Coded magnet safety sensors

**BNS 333**

- With integral evaluation
- Thermoplastic enclosure
- Coded
- Long life, no mechanical wear
- Protection class IP65
- Insensitive to lateral misalignment
- Insensitive to soiling
- With wiring compartment
- With LED
- With actuator BPS 303 SS suitable for food processing industry

#### Technical data

- **Standards:** IEC 60947-5-3, BG-GS-ET-14
- **Design:** rectangular
- **Enclosure:** glass fiber reinforced thermoplastic
- **Protection class:** IP65 to EN 60529
- **Connection:** screw terminals
- **Cable section:** max. 2 x 1.5 mm² (incl. conductor ferrules)
- **Cable entry:** 1 x M20
- **Mode of operation:** magnetic
- **Actuating magnet:** BPS 300, BPS 303, BPS 303 SS, coded
- **S_{aw}:** 4 mm
- **S_{ar}:** 14 mm
- **Switching conditions indicator:** LED
- **Switching voltage:** max. 250 VAC
- **Switching current:** max. 5 A
- **Switching capacity:** max. 1250 W
- **Output:** 1 enabling circuit
- **U_e:** 24 VDC
- **I_e:** max. 40 mA
- **Ambient temperature:** -25 °C ... +55 °C
- **Storage and transport temperature:** -25 °C ... +70 °C
- **Switching frequency:** max. 5 Hz
- **Resistance to shock:** 30 g / 11 ms
- **Resistance to vibration:** 10 ... 55Hz, amplitude 1 mm

#### Classification:

- **Standards:** EN ISO 13849-1
- **B_{10d} (NC):** 20,000,000 for 20% contact load
- **Mission time:** 20 years

**MTTF_{Bd} = \frac{B_{10d}}{0.1 \times n_{op}} \times \frac{d_{op} \times h_{msg} \times 3600 \text{ s/h}}{t_{opn}}**

#### Approvals

#### Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>V</td>
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<td>L</td>
<td>right</td>
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<tr>
<td></td>
<td>D</td>
<td>left</td>
</tr>
<tr>
<td></td>
<td>U</td>
<td>front (cover)</td>
</tr>
</tbody>
</table>

The actuating magnet must be ordered separately. Refer to page 1-112.

#### Note

**Enabling zone**

- **Important Note:**
  - The BNS333 is a 4-wire sensor designed to satisfy PLC per EN ISO 13849-1, or control Category 1 per EN 954-1. They are not designed for use with a separate safety controller.

**Note**

- different directions of actuation:
  - cover, front and below, right and left
- Contact symbols shown for the closed condition of the guard device.
- The LED is illuminated when the guard door is closed.

---

For more information, see our online product catalog: www.usa.schmersal.net
Coded magnet safety sensors

BNS 303

Technical data

- Thermoplastic enclosure
- Coded
- Long life, no mechanical wear
- Protection class IP67
- Insensitive to lateral misalignment
- Insensitive to soiling
- With actuator BPS 303 SS suitable for food processing industry
- With LED available
- EX version available

Approvals

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
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<td>11</td>
<td>1 NO / 1 NC</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>1 NO / 2 NC</td>
</tr>
<tr>
<td>02</td>
<td></td>
<td>2 NC</td>
</tr>
<tr>
<td>03</td>
<td></td>
<td>3 NC</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Without LED</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>With LED</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>With cable</td>
</tr>
<tr>
<td>①</td>
<td></td>
<td>ST</td>
</tr>
<tr>
<td>2187</td>
<td></td>
<td>With connector M12</td>
</tr>
<tr>
<td>⑤</td>
<td>2211</td>
<td>Individual contact outlet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Increased switching distance</td>
</tr>
</tbody>
</table>

Contact variants

1 NO / 1 NC

1 NO / 2 NC

3 NC

1 NO / 2 NC

(Ordering suffix -2187)

Contact symbols shown for the closed condition of the guard device.

Important Note:

Series BNS sensors are only for use in safety applications when used with an electrically compatible safety controller or safety PLC

(See section 5 for appropriate safety controllers)

Note

Enabling zone

The actuating magnet must be ordered separately. Refer to page 1-112.

Classification:

<table>
<thead>
<tr>
<th>Standards</th>
<th>EN ISO 13849-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>B_{10d} (NC/NO)</td>
<td>25,000,000</td>
</tr>
<tr>
<td>Mission time</td>
<td>20 years</td>
</tr>
<tr>
<td>Resistance to shock</td>
<td>30 g / 11 ms</td>
</tr>
<tr>
<td>Resistance to vibration</td>
<td>10 ... 55Hz, amplitude 1 mm</td>
</tr>
</tbody>
</table>

Note

The contact configuration for versions with or without LED is identical.

The LED is illuminated when the guard door is closed.
Coded magnet safety sensors

BNS 300

- With integral evaluation
- Thermoplastic enclosure
- Coded
- Long life, no mechanical wear
- Protection class IP67
- Insensitive to lateral misalignment
- Concealed mounting possible
- Insensitive to soiling
- With LED
- With actuator BPS 303 SS suitable for food processing industry

Technical data

Standards: IEC 60947-5-3, BG-GS-ET-14
Design: cylindrical
Enclosure: glass fiber reinforced thermoplastic, 2 nuts thermoplastic, tightening force A/F 36:
max. 300 Ncm
Protection class: IP67 to EN 60529
Connection: Boflex cable, connector M12
Mode of operation: magnetic
Actuating magnet: BPS 300, BPS 303, BPS 303 SS, coded
S₁₁:
- Ordering suffix -2211 5 mm
- Ordering suffix -2211 8 mm
S₉₉:
- Ordering suffix -2211 15 mm
- Ordering suffix -2211 18 mm
Switching conditions indicator: LED
Switching voltage: max. 250 VAC
Switching current: max. 3 A
Switching capacity: max. 750 W
Output: 1 enabling circuit
Uₑ:
24 VDC
Iₑ:
30 mA
Ambient temperature:
-25 °C ... +55 °C
Storage and transport temperature:
-25 °C ... +70 °C
Switching frequency: max. 5 Hz
Resistance to shock:
30 g / 11 ms
Resistance to vibration:
10 ... 55Hz, amplitude 1 mm
Classification:
Standards: EN ISO 13849-1
B₁₀d (NC/NO):
20.000.000
for 20% contact load
Mission time: 20 years
MTTFd = \( \frac{B_{10d}}{0.1 \times \eta_{op}} \)
\( \eta_{op} = \frac{d_{sw} \times h_{max} \times 3600 \text{s/h}}{t_{cycle}} \)

Contact variants

1 NC
- BN – 24 VDC – L+
- BK – 30 mA – L–

1 NC
Supplementary signal output (Ordering suffix -2230)
- 24 VDC – L+
- 30 mA – L–

1 NC
Supplementary signal output (Ordering suffix -2230)
- 24 VDC – L+
- 100 mA – L–
- 30 mA – L–

Approvals

Ordering details

BNS 300-01ZG-➀-➁

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>➀</td>
<td>ST</td>
<td>With cable</td>
</tr>
<tr>
<td>2</td>
<td>2211</td>
<td>With connector M12</td>
</tr>
<tr>
<td>2</td>
<td>2230</td>
<td>Increased switching distance</td>
</tr>
<tr>
<td>2</td>
<td>2246</td>
<td>Supplementary signal output</td>
</tr>
</tbody>
</table>

The actuating magnet must be ordered separately. Refer to page 1-112.

Note

Contact symbols shown for the closed condition of the guard device.

The LED is illuminated when the guard door is closed.

Important Note:
The BNS300 is a 4-wire sensor designed to satisfy PLC per EN ISO 13849-1, or control Category 1 per EN 954-1. They are not designed for use with a separate safety controller.
Coded magnet safety sensors

BNS 30

- With integral evaluation
- Metal enclosure
- Coded
- Long life, no mechanical wear
- Protection class IP67
- Insensitive to lateral misalignment
- Concealed mounting possible
- Insensitive to soiling
- With LED possible
- With actuator BPS 303 SS suitable for food processing industry

Technical data

Standards: IEC 60947-5-3, BG-GS-ET-14
Design: cylindrical
Enclosure: nickel-plated brass
Protection class: IP67 to EN 60529
Connection: Boflex cable, connector M12
Mode of operation: magnetic
Actuating magnet: BPS 300, BPS 303, BPS 303 SS, coded

S_m: 5 mm
- Ordering suffix -2211, -2334
S_m: 8 mm
- Ordering suffix -2211, -2334
S_m: 15 mm
- Ordering suffix -2211, -2334
S_m: 18 mm
- Ordering suffix -2211, -2334
Swapping conditions indicator: LED
Swapping voltage: max. 250 VAC
Swapping current: max. 3 A
Swapping capacity: max. 750 W
Output: 1 enabling circuit
U_e: 24 VDC
I_e: 30 mA

Ambient temperature: -25 °C ... +55 °C
Storage and transport temperature: -25 °C ... +70 °C
Switching frequency: max. 5 Hz
Resistance to shock: 30 g / 11 ms
Resistance to vibration: 10 ... 55Hz, amplitude 1 mm

Classification:
Standards: EN ISO 13849-1
B_10d (NC/NO): 20,000,000
for 20% contact load
Mission time: 20 years

MTTF_d = \frac{B_{10d}}{0.1 \times n_{op}} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}

Ordering details

<table>
<thead>
<tr>
<th>BNS 30-012(-1-2-3)</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>G</td>
<td>Without LED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>With LED (only for cable)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>With cable</td>
</tr>
<tr>
<td>2</td>
<td>ST</td>
<td>With connector M12</td>
</tr>
<tr>
<td>3</td>
<td>2211</td>
<td>Increased switching distance</td>
</tr>
<tr>
<td></td>
<td>2230</td>
<td>Supplementary signal output</td>
</tr>
<tr>
<td></td>
<td>2334</td>
<td>Increased switching distance and supplementary signal output</td>
</tr>
<tr>
<td>2246</td>
<td>U_e 42 VAC</td>
<td></td>
</tr>
</tbody>
</table>

Contact symbols shown for the closed condition of the guard device.

The LED is illuminated when the guard door is closed.

Important Note:
The BNS30 is a 4-wire sensor designed to satisfy PLC per EN ISO 13849-1, or control Category 1 per EN 954-1. They are not designed for use with a separate safety controller.
Coded magnet safety sensors

System components

Ordering details

Actuating magnet:
- thermoplastic enclosure  BPS 300
- For food processing industry rear mounted: thermoplastic enclosure  BPS 303
- stainless steel enclosure  BPS 303 SS
Coded magnet safety sensors

**BNS-B20**

- Thermoplastic enclosure
- Non-contact safety switch
- No protruding actuator, no risk of injury
- Does not protrude into the door opening
- Substitutes door-handle and safety switch, no further door fittings required
- Modern and symmetric design
- Fitted with four screws only
- Latching force of approx. 100 N
- Tamper-proof because of integral coded safety sensor
- LED indication
- Ergonomic operation
- Suitable for hinged and sliding guards

**Technical data**

- Standards: IEC 60947-5-3; BG-GS-ET-14
- Enclosure: glass fiber reinforced thermoplastic
- Protection class: IP67 to EN 60529
- Connection: connector M12, 8-pole or cable LiYY 6 x 0.25 mm², 1m
- Mode of operation: magnetic
- S₀⁺: 0 mm
- S₀⁻: 22 mm
- Switching conditions indicator: LED only for ordering suffix G
- Switching voltage
  - with connector: max. 24 VDC
  - with connector and LED: max. 24 VDC
  - with cable: max. 110 VAC/DC
  - with cable and LED: max. 24 VDC
- Switching current
  - with LED: max. 10 mA
  - without LED: max. 250 mA
- Switching capacity
  - with LED: max. 240 mW
  - without LED: max. 3 W
- Signalling contact
  - NO/NC connection: S₁₃-S₁₄
  - NC/NC connection: S₂₁-S₂₂
- Safety contacts
  - NO/NC connection: S₁₃-S₁₄; S₂₁-S₂₂
  - NC/NC connection: S₂₁-S₂₂; S₃₁-S₃₂
- Ambient temperature: -25 °C ... +70 °C
- Storage and transport temperature: -25 °C ... +70 °C
- Switching frequency: max. 5 Hz
- Resistance to shock: 30 g / 11 ms
- Resistance to vibration: 10 ... 55 Hz, amplitude 1 mm
- Max. door weight: hinged guard: 5 kg, sliding guard: 3 kg

**Classification:**

- Standards: EN ISO 13849-1
- B₁₀₀ (NC/NO): 25,000,000 for 20% contact load
- Mission time: 20 years
- MTTF = \( \frac{B_{100}}{0.1 \times n_{op}} \) \( n_{op} = \frac{d_{op} \times h_{op} \times 3600 \, s/h}{t_{cycle}} \)

**Contact variants**

<table>
<thead>
<tr>
<th>1 NO / 2 NC</th>
<th>(3) GY S₁₃ S₁₄ PK (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO / 1 NC</td>
<td>(1) GN S₁₁ S₂₂ YE (2)</td>
</tr>
<tr>
<td>2 NC</td>
<td>(5) WH S₁₃ S₁₂ BN (6)</td>
</tr>
</tbody>
</table>

**Ordering details**

<table>
<thead>
<tr>
<th>BNS-B20-12-1 NO / 2 NC</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 1 NO / 1 NC</td>
<td></td>
</tr>
<tr>
<td>02 2 NC</td>
<td></td>
</tr>
<tr>
<td>2 Without LED</td>
<td></td>
</tr>
<tr>
<td>G With LED</td>
<td></td>
</tr>
<tr>
<td>H With bottom cable</td>
<td></td>
</tr>
<tr>
<td>ST With bottom M12 connector</td>
<td></td>
</tr>
<tr>
<td>L Left hand door *</td>
<td></td>
</tr>
<tr>
<td>R Right hand door *</td>
<td></td>
</tr>
</tbody>
</table>

* Only for bottom cable or connector version

**Approvals**

CE

**Important Note:**

Series BNS sensors are only for use in safety applications when used with an electrically compatible safety controller or safety PLC. (See section 5 for appropriate safety controllers)

**Note**

The safety sensor and the actuator must be ordered separately.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

The BNS-B20 can be connected to:

- safety monitoring relays with NO/NC inputs, the remaining NC contact can be used as signalling contact
- safety monitoring relays with NC/NC inputs, the remaining NO contact can be used as signalling contact.

**Contact**

Contact symbols shown for the closed condition of the guard device.

The contact configuration for versions with or without LED is identical.

The LED is illuminated when the guard door is closed.

For more information, see our online product catalog: www.usa.schmersal.net
## Coded magnet safety sensors

<table>
<thead>
<tr>
<th>System components</th>
<th>System components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear cable</td>
<td>BNS-B20-B01</td>
</tr>
<tr>
<td>Left hand door</td>
<td>Connector</td>
</tr>
<tr>
<td>Right hand door</td>
<td></td>
</tr>
</tbody>
</table>

### Ordering details

<table>
<thead>
<tr>
<th>Component</th>
<th>Ordering suffix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear cable</td>
<td>-H</td>
</tr>
<tr>
<td>Left hand door</td>
<td>-L</td>
</tr>
<tr>
<td>Right hand door</td>
<td>-R</td>
</tr>
<tr>
<td>Actuator</td>
<td>BNS-B20-B01</td>
</tr>
</tbody>
</table>

The safety sensor and the actuator must be ordered separately.

- Connector M12, 4-pole
  - without cable: 101209950
  - with cable 5 m: 101208523
- Connector M12, 8-pole
  - with cable 5 m: 101209967
Safe signalling and monitoring
Safety rated limit switches and Safety switches for hinged guards

Position or limit switches are used with movable machine guards or detect the presence of materials. These switches feature positive break contacts which make them suitable for safety applications.

Hinged switches are used to monitor the position of hinged safety guards. They prevent machine operation while the door is ajar.

Position Switches
- PS116
- T 235 / 236
- T 335 / 336

Hinged Switches
- T.C 235 / 236
- TVS 335
- TESZ
- TESF
- TESK

For more information, see our online product catalog: www.usa.schmersal.net
Position switches

**PS116**

- Diecast Zinc and Thermoplastic enclosure
- Compact design 31 x 57 x 16 mm
- Reliable position detection
- Available with 2 or 3 contacts in various configurations
- Available with positive break NC contacts
- Snap action offers optional latching with manual reset via pin
- Slow action available with overlapping or staggered contacts
- Wide range of alternative actuators
- M12 connector or 2 m prewired cable from bottom or side
- Symmetrical housing for mounting options
- All switching elements feature contact opening 2 x 2 mm, meeting requirements of EN81.1 for use in elevators
- Protection rating IP66 / IP67 to EN 60529
- Contact material: silver
- Contact type: change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges

**Switching principle:**
- IEC 60947-5-1
- Slow or snap action, NC contacts with positive break

**Connection:**
- M12 connector or prewired cable
- Connecting cable: PVC LIYYW grey 4 x 0.5 mm² or 6 x 0.5 mm²

**Utilization category:**
- AC-15, DC-13

**Rated operation current / voltage (Iₑ/Uₑ):**
- prewired cable: 3 A / 240 VAC, 1.5 A / 24 VDC
- M12, 4 pole: 1.5 A / 240 VAC, 1.5 A / 24 VDC
- M12, 8 pole: 1.5 A / 24 VDC

**Rated impulse withstand voltage U_imp:**
- prewired cable: 4 kV
- M12, 4 pole: 2.5 kV
- M12, 8 pole: 0.8 kV

**Rated insulation voltage Ui:**
- cable, connector M12, 4 pole: 300 V
- connector M12, 8 pole: 30 V (PELV)

**Max. fuse rating:**
- 6 A gG D-fuse

**Ambient temperature:**
- -30 °C … +80 ºC

**Mechanical life:**
- 10 million operations

**Switching frequency:**
- max. 5,000/h

**Bounce duration:**
- snap action: < 3 ms;
- slow action: in accordance with actuating speed

**Switchover time:**
- slow action: in accordance with actuating speed

**Classification:**
- EN ISO 13849-1
- applicable up to cat 1 / PLc
- Classification, 2 channel usage:
  - applicable up to cat 3/PLd w/ suitable logic unit

**B₁₀d (NC):**
- 20,000,000

**B₁₀d (NO):**
- 1,000,000

**for max. 10% ohmic contact load**

**Service life:**
- 20 years

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>➀</td>
<td>Contact action / configuration</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Snap action</td>
<td></td>
</tr>
<tr>
<td>Z02</td>
<td>2 NC</td>
<td></td>
</tr>
<tr>
<td>Z02R</td>
<td>2 NC, latching</td>
<td></td>
</tr>
<tr>
<td>Z11</td>
<td>1 NO &amp; 1 NC</td>
<td></td>
</tr>
<tr>
<td>Z11R</td>
<td>1 NO &amp; 1 NC, latching</td>
<td></td>
</tr>
<tr>
<td>Z12</td>
<td>1 NO &amp; 2 NC</td>
<td></td>
</tr>
<tr>
<td>Z12R</td>
<td>1 NO &amp; 2 NC, latching</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Slow Action</td>
<td></td>
</tr>
<tr>
<td>T02</td>
<td>2 NC</td>
<td></td>
</tr>
<tr>
<td>T02H</td>
<td>2 NC staggered</td>
<td></td>
</tr>
<tr>
<td>T11</td>
<td>1 NO &amp; 1 NC</td>
<td></td>
</tr>
<tr>
<td>T11UE</td>
<td>1 NO &amp; 1 NC, overlapping</td>
<td></td>
</tr>
<tr>
<td>T20</td>
<td>2 NO*</td>
<td></td>
</tr>
<tr>
<td>T03</td>
<td>3 NC</td>
<td></td>
</tr>
<tr>
<td>T12</td>
<td>1 NO &amp; 2 NC</td>
<td></td>
</tr>
<tr>
<td>T21</td>
<td>2 NO &amp; 1 NC</td>
<td></td>
</tr>
</tbody>
</table>

| ➁ | L200 | 2 m cable, from bottom |
| ➁ | L200R | 2 m cable, from side |
| ➁ | ST | Connector M12 |
| ➁ | STR | Connector M12 |

**Note**

Switch body is symmetrical, can be mounted with connector or cable from right or left, rotating the actuator head to the correct position.

Actuator head can be rotated to one of 8 positions (45° offset). Rotating of actuator requires use of adjustment tool.
Position switches

Plunger / lever options

S200 plunger
R200 roller plunger
K200 offset roller lever
K210 offset roller lever
K230 angle roller lever
K240 angle roller lever
K250 angle roller lever
H200 roller lever
N200 roller lever
J200 rod lever*

Ordering details

Individual actuators:
- S200 plunger: PS-S200
- R200 roller plunger: PS-R200
- K200 offset roller lever: PS-K200
- K210 offset roller lever: PS-K210
- K230 angle roller lever: PS-K230
- K240 angle roller lever: PS-K240
- K250 angle roller lever: PS-K250
- H200 roller lever: PS-H200
- N200 roller lever: PS-N200
- J200 rod lever*: PS-J200

Adjustment tool:
- ACC-PS116-1

M12 Connector cables
- 4-pole cable, 5 meter length: 103006760
- 8-pole cable, 5 meter length: 101209964
- 8-pole cable, 10 meter length: 101209960

* rod lever not appropriate for use in safety applications
Position switches

**Z/T 235**

- Metal enclosure
- Available with 2 positive break NC contacts
- Snap action with constant contact pressure up to switching point
- Slow action available with overlapping or staggered contacts
- Wiring compartment
- 1 cable entry M20
- Wide range of alternative actuators
- Actuator heads can be repositioned by 4 x 90°
- Angle of roller lever adjustable in 10° steps
- Good resistance to oil and petroleum spirit
- Metal roller available on request
- EX version available
- AS-Interface Safety at Work available

**Z/T 236**

- Thermoplastic enclosure
- Double insulated
- Available with 2 positive break NC contacts
- Snap action with constant contact pressure up to switching point
- Slow action available with overlapping or staggered contacts
- 1 cable entry M20
- Wide range of alternative actuators
- Actuator heads can be repositioned by 4 x 90°
- Angle of roller lever adjustable in 10° steps
- Good resistance to oil and petroleum spirit
- AS-Interface Safety at Work available

### Technical data

- **Standards:**
  - IEC/EN 60947-5-1
  - BG-GS-ET-15
- **Design:**
  - fixings to EN 50047
- **Enclosure:**
  - Z/T 235: zinc die-cast, enamel finish
  - Z/T 236: Glass fiber reinforced thermoplastic
- **Protection class:** IP67 to EN 60529
- **Contact material:** silver
- **Contact type:** change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
- **Switching principle:**
  - slow or snap action
  - NC contacts with positive break
- **Connection:**
  - screw terminals
- **Cable entry:**
  - 1 x M20
- **U_{imp}:**
  - 6 kV
- **U:**
  - connector: 0.8 kV
  - 500 V
  - connector: 4 A / 230 VAC
  - 4 A / 24 VDC
  - connector: 4 A / 50 V
- **Max. fuse rating:** 6 A gG D-fuse
- **Ambient temperature:** -30 °C ... +80 °C
- **Mechanical life:** 20 million operations
- **Bounce duration:**
  - snap action: < 3 ms
  - slow action: in accordance with actuating speed
- **Switchover time:**
  - snap action: > 5.5 ms
  - slow action: in accordance with actuating speed
- **Classification:**
  - Standards:
    - EN ISO 13849-1
  - B_{tof} (NC):
    - 20,000,000
  - B_{tof} (NO):
    - 1,000,000
  - for max. 10% ohmic contact load
  - Mission time:
    - 20 years
- **MTTF =**, **n_{op} =**, **d_{op} x n_{op} x 3600 s/h**, **t_{cycle}**

### Approvals

- UL
- CE

### Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Z</td>
<td>Snap action</td>
</tr>
<tr>
<td>2</td>
<td>T</td>
<td>Slow action</td>
</tr>
<tr>
<td>3</td>
<td>S</td>
<td>Metal housing</td>
</tr>
<tr>
<td>4</td>
<td>02</td>
<td>Plastic housing</td>
</tr>
<tr>
<td>5</td>
<td>11</td>
<td>1 NO / 1 NC</td>
</tr>
<tr>
<td>6</td>
<td>20</td>
<td>2 NO</td>
</tr>
<tr>
<td>7</td>
<td>H</td>
<td>Slow action</td>
</tr>
<tr>
<td>8</td>
<td>UE</td>
<td>with staggered contacts</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>with overlapping contacts</td>
</tr>
</tbody>
</table>

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>NPT</td>
<td>Cable entry M20</td>
</tr>
<tr>
<td>7</td>
<td>ST</td>
<td>Cable entry NPT 1/2</td>
</tr>
<tr>
<td>8</td>
<td>2310</td>
<td>Connector M12</td>
</tr>
<tr>
<td>9</td>
<td>1297</td>
<td>(A-Coding)</td>
</tr>
<tr>
<td>10</td>
<td>1637</td>
<td>(B-Coding)</td>
</tr>
<tr>
<td>11</td>
<td>2138</td>
<td>Enclosure with transversely slotted mounting holes</td>
</tr>
<tr>
<td>12</td>
<td>2138</td>
<td>Roller lever 7H for safety duties</td>
</tr>
<tr>
<td>13</td>
<td>1637</td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

### Note

- Caution! The versions with connector may only be used in PELV circuits to EN 60204-1.

- * Switches with 2 NO contacts (20) are only available for T (Slow Action) versions and are only suitable for positioning tasks.
Position switches

Plunger / lever options

Plunger S

Plunger 4S

Plunger R

Plunger 4R

Offset Roller Lever 1R

Offset Roller K

Angle Roller Lever 3K

Angle Roller Lever 4K

Angle Roller Lever K4

Roller Lever 1H

Roller Lever 7H

Roller Lever 7H-2138

Roller Lever 10H

Roller Lever 12H

Roller Lever 14H
Position switches

**Z/T 335**

- Metal enclosure
- Snap action with constant contact pressure up to switching point
- Slow or snap action available with 2 positive break NC contacts to EN 60947-5-1
- Slow action available with overlapping or staggered contacts
- 1 cable entry M20
- Wide range of alternative actuators
- Actuator heads can be repositioned by 4 x 90°
- Angle of roller lever adjustable in 10° steps
- Good resistance to oil and petroleum spirit
- Metal roller available on request
- EX version available
- AS-Interface Safety at Work available

**Z/T 336**

- Thermoplastic enclosure
- Double insulated
- Slow action or snap action available with 2 positive break NC contacts to EN 60947-5-1
- Snap action with constant contact pressure up to switching point
- Slow action available with overlapping or staggered contacts
- 1 cable entry M20
- Wide range of alternative actuators
- Actuator heads can be repositioned by 4 x 90°
- Angle of roller lever adjustable in 10° steps
- Good resistance to oil and petroleum spirit
- Metal roller available on request
- AS-Interface Safety at Work available

### Technical data

- Standards: IEC/EN 60947-5-1
- Design: DIN EN 50041
- Enclosure: 335: light-alloy die cast, paint finish
- Protection class: IP67 to EN 60529
- Contact material: silver
- Contact type: slow or snap action, NC contacts with positive break
- Connection: screw terminals
- Cable section: max. 2.5 mm² (incl. conductor ferrules)
- Cable entry: 1 x M20
- Uimp: 6 kV
- -03z, -12z: 4 kV
- connector: 0.8 kV
- Ui: 500 V
- -03z, -12z: 250 V
- connector: 50 V
- Ith: 10 A
- Utilization category: AC-15, DC-13
- Ie / Ue: 4 A / 230 VAC
- 4 A / 24 VDC
- connector: 4 A / 50 V
- Max. fuse rating: 6 A gG D-fuse
- Ambient temperature: -30 °C ... +80 °C
- Mechanical life: 30 million operations
- Switching frequency: max. 5,000/h
- Bounce duration: snap action: in accordance with actuating speed; slow action: < 2 ms
- Switchover time: snap action: < 2 ms; slow action: in accordance with actuating speed

### Approvals

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Snap action</td>
</tr>
<tr>
<td>T</td>
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</tr>
<tr>
<td>5</td>
<td>Metal housing</td>
</tr>
<tr>
<td>6</td>
<td>Plastic housing</td>
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<tr>
<td>11</td>
<td>1 NO / 1 NC</td>
</tr>
<tr>
<td>02</td>
<td>2 NC</td>
</tr>
<tr>
<td>20</td>
<td>2 NO</td>
</tr>
<tr>
<td>01/01</td>
<td>1 NC left / 1 NC right</td>
</tr>
<tr>
<td>12</td>
<td>1 NO / 2 NC**</td>
</tr>
<tr>
<td>03</td>
<td>3 NC**</td>
</tr>
<tr>
<td>5</td>
<td>Slow action</td>
</tr>
<tr>
<td>H</td>
<td>with staggered contacts</td>
</tr>
<tr>
<td>UE</td>
<td>with overlapping contacts</td>
</tr>
</tbody>
</table>

### Note

Caution! The versions with connector may only be used in PELV circuits to EN 60204-1.

* Switches with 2 NO contacts (20) are only available for T (Slow Action) versions and are only suitable for positioning tasks.

** Switches with 1 NO & 2 NC contacts (12) or 3 NC contacts (03) are only available for 335 (metal) housings with T (Slow Action) contacts.

### Ordering details

**Z/T 335**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
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<tr>
<td>G24</td>
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<td></td>
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<tr>
<td>7</td>
<td>NPT ST</td>
<td></td>
</tr>
<tr>
<td>2310</td>
<td>Cable entry M20</td>
<td></td>
</tr>
<tr>
<td>2138</td>
<td>Connector M12</td>
<td></td>
</tr>
<tr>
<td>1637</td>
<td>Roller lever 7H for safety duties</td>
<td></td>
</tr>
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**Z/T 336**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>G24</td>
<td>With LED</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>NPT ST</td>
<td></td>
</tr>
<tr>
<td>2310</td>
<td>Cable entry M20</td>
<td></td>
</tr>
<tr>
<td>2138</td>
<td>Connector M12</td>
<td></td>
</tr>
<tr>
<td>1637</td>
<td>Roller lever 7H for safety duties</td>
<td></td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: www.usa.schmersal.net
Position switches

**Plunger / Lever options**

**Plunger S**
- Actuator type B to EN 50041
- Required actuating force: 12 N for snap action, 17 N for slow action
- Actuating speed with actuating angle 0° to switch axis: max. 0.5 m/s

**Roller plunger R**
- Actuator type C to EN 50041
- Required actuating force: 12 N for snap action, 17 N for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 0.5 m/s

**Offset roller lever 1K**
- Required actuating force: 12 N for snap action, 17 N for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 0.5 m/s

**Angle roller lever 3K**
- Required actuating force: 12 N for snap action, 17 N for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 0.5 m/s
- Actuation parallel to axis of switch from below

**Roller lever H**
- Actuator type A to EN 50041
- Required actuating torque: 26 Ncm for snap action, 31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

On version TVH ...-01/01z positive break only to one side.

**Roller lever 7H**
- Only for positioning tasks
- Required actuating torque: 26 Ncm for snap action, 31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

**Roller lever 7H-2138**
- For safety tasks ⊙, positive break
- Required actuating torque: 26 Ncm for snap action, 31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

On version TVH7 ...-01/01z-2138 positive break only to one side.

**Note**
- LED version
- Ordering suffix G24, Protected against incorrect polarity and voltage spikes.
Safety switch for hinged guards

**T.C 235**
- Metal enclosure
- Versions available for left-hand (T3C 235), right-hand (T5C 235) and swing-doors (T4C 235)
- 1 cable entry M20
- Good resistance to oil and petroleum spirit
- Actuator heads can be repositioned in steps 4 x 90°
- Opening angle 180°
- Stainless steel actuator
- EX version available

**T.C 236**
- Thermoplastic enclosure
- Versions available for left-hand (T3C 236), right-hand (T5C 236) and swing-doors (T4C 236)
- Double insulated
- 1 cable entry M20
- Good resistance to oil and petroleum spirit
- Actuator heads can be repositioned in steps 4 x 90°
- Opening angle 180°
- Stainless steel actuator

**Technical data**
- **Standards:** IEC/EN 60947-5-1
- **Design:** fixings to EN 50047
- **Enclosure:** 235: light-alloy diecast, paint finish, 236: Glass fiber reinforced thermoplastic
- **Protection class:** IP67 to EN 60529
- **Contact material:** silver
- **Contact type:** change-over contact with double break Zb or 1 NC or 2 NC contacts, with galvanically separated contact bridges
- **Switching principle:** IEC 60947-5-1 slow action, NC contact with positive break
- **Connection:** screw terminals
- **Cable entry:** 1 x M20
  - U_{imp} = 6 kV
  - U = 500 V
  - I_{imp} = 10 A
  - Utilization category: AC-15
  - I_{imp}/U_{imp} = 4 A / 230 VAC
  - 1 A / 24 VDC
  - Max. fuse rating: 6 A gG D-fuse
  - Ambient temperature: -30 °C ... +80 °C
  - Mechanical life: > 1 million operations
  - Switching frequency: max. 5,000/h
  - Positive break angle: 12.5°
  - Positive break torque: 0.185 Nm
- **Classification:** Standards: EN ISO 13849-1
  - B_{req} (NC): 20,000,000
  - Mission time: 20 years
  - MTTF_{Bd} = \frac{B_{req}}{0.1 x n_{op}} \cdot \frac{n_{op} \cdot d_{op} \cdot h_{op} \cdot 3600 \cdot s/h}{t_{cycle}}

**Approvals**
- UL
- CE

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
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<td>3</td>
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<td></td>
<td>4</td>
<td>Swing-door version</td>
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<tr>
<td></td>
<td>5</td>
<td>Right-hand version</td>
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<tr>
<td>2</td>
<td>01</td>
<td>1 NC</td>
</tr>
<tr>
<td></td>
<td>02</td>
<td>2 NC</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>1 NO / 1 NC</td>
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</tr>
<tr>
<td></td>
<td>2310</td>
<td>(B-Coding)</td>
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</tbody>
</table>

**Note**
Caution! The versions with connector may only be used in PELV circuits to EN 60204-1.

**Connector**

1 NO

1 NC

2 NC
Safety switch for hinged guards

Left-hand version (3)

- Good resistance to oil and petroleum spirit
- Actuator heads can be repositioned by 4 x 90°
- Opening angle 180°

Closed guard device = 0° in contact switch travel diagrams.
This is the rest position of the switch

Swing-door version (4)

- Good resistance to oil and petroleum spirit
- Actuator heads can be repositioned in steps 4 x 90°
- Opening angle 2 x 90°

Closed guard device = 0° in contact switch travel diagrams.
This is the rest position of the switch

Right-hand version (5)

- Good resistance to oil and petroleum spirit
- Actuator heads can be repositioned by 4 x 90°
- Opening angle 180°

Closed guard device = 0° in contact switch travel diagrams.
This is the rest position of the switch

<table>
<thead>
<tr>
<th>Contacts/</th>
<th>Switch travel</th>
<th>Slow action</th>
<th>Contacts/</th>
<th>Switch travel</th>
<th>Slow action</th>
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<th>Slow action</th>
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<td>1 NO / 1 NC</td>
<td>T4C 235-11Z</td>
<td>1 NO / 1 NC</td>
<td>T5C 235-11Z</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1 NO / 1 NC</td>
<td>T3C 236-11Z</td>
<td>T4C 236-11Z</td>
<td>T5C 236-11Z</td>
<td>T5C 236-11Z</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NC</td>
<td>T3C 235-01Z</td>
<td>1 NC</td>
<td>T4C 235-01Z</td>
<td>1 NC</td>
<td>T5C 235-01Z</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 NC</td>
<td>T3C 236-01Z</td>
<td>T4C 236-01Z</td>
<td>T5C 236-01Z</td>
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<td>2 NC</td>
<td>T3C 235-02Z</td>
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<td>T4C 235-02Z</td>
<td>2 NC</td>
<td>T5C 235-02Z</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 NC</td>
<td>T3C 236-02Z</td>
<td>T4C 236-02Z</td>
<td>T5C 236-02Z</td>
<td>T5C 236-02Z</td>
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<td></td>
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</tbody>
</table>
Safety switch for hinged guards

**TV.S 335**

- Metal enclosure
- Good resistance to oil and petroleum spirit
- Actuator heads can be repositioned in steps 4 x 90° using Torx T 20 screwdriver and pin
- Actuator shaft can be turned 360°
- 1 cable entry M20
- LED version available
- Shaft bore Ø 8 mm or 10 mm

**Technical data**

- Standards: IEC/EN 60947-5-1
  - EN ISO 13849-1
  - BG-GS-ET-15
- Design: fixings to EN 50041
- Enclosure: light-alloy diecast, paint finish
- Protection class: IP67 to EN 60529
- Contact material: silver
- Contact type: change-over contact with double break Zb or 1 NC or 2 NC contacts, with galvanically separated contact bridges
- Switching principle: IEC 60947-5-1
  - slow action, NC contact with positive break
- Connection: screw terminals or connector
- Cable section: (rigid/flexible):
  - min. 0.75 mm²
  - max. 2.5 mm²
  - (incl. conductor ferrules)
- Cable entry: 1 x M20
  - connector: 6 kV
  - connector: 0.8 kV
  - connector: 500 V
  - connector: 50 V
  - connector: 10 A
- Utilization category: AC-15, DC-13
- I/U: 4 A / 230 VAC
  - connector: 4 A / 50 V
  - connector: 2 NC
- Max. fuse rating: 6 A gG D-fuse (DIN EN 60269-1)
- Ambient temperature: -25 °C ... +70 °C
- Mechanical life: > 1 million operations
- Switching frequency: max. 1,000/h
- Shaft bore: Ø 8 mm / 10 mm
- Positive break angle: 7°
- Positive break torque: 0.6 Nm

**Classification:**

- Standards: EN ISO 13849-1
- Brel (NC): 20,000,000
- Mission time: 20 years
- MTTFd = \( \frac{B_{rel}}{0.1 \times n_{op}} \) = \( \frac{d_{op} \times n_{op} \times 3600 \text{s/h}}{t_{cycle}} \)

**Approvals**

- UL
- CE

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
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<td>8</td>
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<td>Shaft bore Ø 8 mm</td>
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<td>10</td>
<td></td>
<td>Shaft bore Ø 10 mm</td>
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<td>02</td>
<td></td>
<td>2 NC</td>
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<tr>
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<td>3 NC</td>
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<td>11</td>
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<tr>
<td>12</td>
<td></td>
<td>1 NO / 2 NC</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>Cable entry M20</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>Cable entry NPT 1/2&quot;</td>
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<tr>
<td>ST</td>
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<td>Connector M12 (A-Coding)</td>
</tr>
<tr>
<td>2310</td>
<td></td>
<td>(B-Coding)</td>
</tr>
</tbody>
</table>

**Contact variants**

- 1 NO
- 1 NC
- 2 NC
- 3 NC

**Contact variants diagram**

**Note**

- Closed guard device = 0° in contact switch travel diagrams. This is the rest position of switch.

**Caution!** The versions with connector may only be used in PELV circuits to EN 60204-1.

- Setting assistance: Grub screw for location, shaft pre-drilled for pin
- Universal joint available to compensate for axial displacement (only for shaft bore 10 mm), see the following pages 1-127.

**Technical data**

- LED version:
  - Ordering suffix G24, only available for version with one NO and one NC contact.
  - Protected against incorrect polarity and voltage spikes.
Safety switch for hinged guards

**TESZ**

- Thermoplastic enclosure
- Double insulated
- Simple mounting, especially on 40 mm profiles
- Good resistance to oil and petroleum spirit
- 2 cable entries M20
- For left or right hinged doors
- Fixing holes for M6 countersunk screws to DIN 965
- The additional hinge including mounting accessories is also available separately.

**Technical data**

- Standards: IEC/EN 60947-5-1, BG-GS-ET-15
- Enclosure: glass fiber reinforced thermoplastic, self-extinguishing
- Hinge: aluminum
- Protection class: IP65 to EN 60529
- Contact material: silver
- Contact type: change-over contact with double break, type Zb or 3 NC contacts
- Switching principle: slow action, NC contact with positive break
- Connection: screw terminals
- Cable section: max. 1 mm² (incl. conductor ferrules)
- Cable entry: 2 x M20
- \( U_{\text{imp}} \): 2.5 kV
- \( U_e \): 250 V
- \( I_{\text{lim}} \): 2.5 A
- Utilization category: AC-15, DC-13
- \( I_{\text{lim}}/U_e \): 2 A / 230 VAC
- Max. fuse rating: 2 A gG D-fuse
- Ambient temperature: -25 °C … +65 °C
- Mechanical life: > 1 million operations
- Switching frequency: max. 120/h
- Positive break angle: 10°

**Approvals**

- CE
- UL
- CB

**Ordering details**

<table>
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<tr>
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<th>Option</th>
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<td>1102</td>
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<tr>
<td>②</td>
<td>1110</td>
<td>3 NC</td>
</tr>
<tr>
<td>③</td>
<td>S</td>
<td>with extra hinge</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>30 mm profiles</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>35 mm profiles</td>
</tr>
<tr>
<td></td>
<td>45</td>
<td>45 mm profiles</td>
</tr>
</tbody>
</table>

**System components**

**Additional hinge**

Part numbers for extra hinges:
- (no switch)
- TESZ/S/30 for 30 mm profiles
- TESZ/S/35 for 35 mm profiles
- TES/S for 40 mm profiles
- TES/S/45 for 45 mm profiles

**Note**

The opening angle has been set to 4° in factory.

Until the limit of the mechanical life has been reached the angle can increase up to 10° under normal wear-out conditions.

**Contact variants**

1 NO
2 NC
3 NC

For more information, see our online product catalog: [www.usa.schmersal.net](http://www.usa.schmersal.net)
Safety switch for hinged guards

**TESF**

- Metal enclosure
- Adjustable switching angle
- Opening angle 180°
- Mountable on the inside and the outside of the safety guard
- Screw terminals, cage clamps or connector
- Simple mounting, for all common profile systems (30 … 60 mm)
- Oil and petroleum resistant
- 2 cable entries M16
- For left or right hinged doors

---

**Technical data**

- Standards: IEC/EN 60947-5-1
- Enclosure: light-alloy diecast
- Protection class: IP65 to EN 60529
- Contact material: AgNi10
- Contact type: 2x change-over contact with double break, type Zb
- Switching principle: IEC 60947-5-1 slow action, NC contact with positive break
- Connection: screw terminals or cage clamps or connector
- Cable section: max. 1 mm² (incl. conductor ferrules)
- Cable entry: 2 x M16
- U_{imp}: 2.5 kV; ordering suffix ST1 and ST2: 0.8 kV
- U_{i}: 250 V
- I_{imp}: 2.5 A
- Utilization category: AC-15; DC-13
- I_{imp}/U_{i}: 2 A / 230 VAC; 1 A / 24 VDC
- Max. fuse rating: 2 A gG D-fuse to DIN EN 60204-1
- Ambient temperature: -25 °C … +65 °C
- Mechanical life: > 1 million operations
- Switching frequency: 120/h
- Positive break angle: 10°
- Classification:
  - Standards: EN ISO 13849-1
  - B_{nu} (NC): 2,000,000
  - Mission time: 20 years
- Contact variants: 2 NO/2 NC

---

**Contact variants**

**Ordering details**

<table>
<thead>
<tr>
<th>TESF</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
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<td>A</td>
<td>no alignment aid</td>
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<td>with alignment aid</td>
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<tr>
<td>➁</td>
<td>S</td>
<td>with extra hinge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>without extra hinge</td>
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<tr>
<td>❼</td>
<td>ST24.1</td>
<td>connector on bottom</td>
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<tr>
<td></td>
<td>ST24.2</td>
<td>connector on top</td>
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<td>➄</td>
<td>180</td>
<td>for inside mounting</td>
</tr>
<tr>
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<td>0</td>
<td>for outside mounting</td>
</tr>
<tr>
<td></td>
<td>U</td>
<td>Adjustable switch point</td>
</tr>
</tbody>
</table>

**Note**

The connector versions (ST1 and ST2) should only be used in PELV circuits to EN 60204-1.

---

**Approvals**

- CE

---

For more information, see our online product catalog: www.usa.schmersal.net
Safety switch for hinged guards

System components

Bottom connector ST24.1

Additional hinge TESF/S

Top connector ST24.2

Additional hinge TESFA/S

With alignment aid order version A

Adjustment tool TESF-14

Ordering details

Connector M12, 8 pins, 24 VDC,
bottom ST24.1 Additional hinge
top ST24.2 without alignment aid
With alignment aid order version A
TESF/S with alignment aid
TESFA/S

Adjustment tool TESF-14
Safety switch for hinged guards

### Technical data

**Standards:**
- IEC/EN 60947-5-1
- BG-GS-ET-15

**Enclosure:**
- Zinc diecast with thermoplastic enclosure covers

**Hinge pin:**
- Galvanized steel/SteelC45

**Protection class:**
- IP65 to EN 60529

**Contact material:**
- Silver, gold plated

**Contact type:**
- Change-over contact with double break, type Zb

**Switching principle:**
- IEC 60947-5-1
- Slow action, NC contact with positive break

**Connection:**
- Connector M12, or cable

**Cable section:**
- Y-UL 2464 / 9 x AWG 22 / 9 x 0.34 mm²
- Y-UL 2464 / 5 x AWG 22 / 5 x 0.34 mm²

**Switching angle:**
- 3° from zero point

**Forced opening angle:**
- 10° from zero point

**Maximum swivel angle:**
- 270°

**Utilization category:**
- AC-15; DC-13

**Rated operating current / voltage (Iₑ / Uₑ):**
- Cable 2 A / 230 VAC; 1 A / 24 VDC
- Connector 1 A / 24 VDC

**Max. fuse rating:**
- 2 A gG D-fuse

**Ambient temperature:**
- -25 °C ... +65 °C

**Storage/transport temp:**
- -40 °C ... +85 °C

**Mechanical breaking load:**
- 5,000 N

**Mechanical life:**
- > 1 million operations relates to opening angle of 90°, without passing over the switch point. Moving over the switch point reduces the life cycle.

**Switching frequency:**
- Max. 120 operations/h

**Classification:**
- Standards: EN ISO 13849-1
- Classification: applicable up to cat 1 / PLc
- Classification, 2 channel usage: applicable up to cat 3/PLd w/ suitable logic unit

**B₁₀d (NC):**
- 20,000,000

**B₁₀d (NO):**
- 1,000,000

**for max. 10% ohmic contact load**

**Service life:**
- 20 years

### System components

**Additional hinge TESK-ZS**

**Additional hinge TESK-ZL**

**Adjustment tool TESF-14**

### Notes

L1 & L2 versions also available with 3, 5, or 10 meter cable. Consult factory

The versions -22ST, -13ST, and -12ST should only be used in PELV circuits to EN 60204-1.

### System components

**Ordering details**

**TESK-➀➁-➂➃**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>➀</td>
<td>S</td>
<td>Standard hinge</td>
</tr>
<tr>
<td>➁</td>
<td>A</td>
<td>Long hinge half</td>
</tr>
<tr>
<td>➋</td>
<td>ST1</td>
<td>Connector, bottom</td>
</tr>
<tr>
<td>➋</td>
<td>ST2</td>
<td>Connector, top</td>
</tr>
<tr>
<td>➋</td>
<td>L1</td>
<td>1 m Cable, bottom</td>
</tr>
<tr>
<td>➋</td>
<td>L2</td>
<td>1 m Cable, top</td>
</tr>
</tbody>
</table>

**L1 & L2 versions also available with 3, 5, or 10 meter cable. Consult factory**

The versions -22ST, -13ST, and -12ST should only be used in PELV circuits to EN 60204-1.
Safety switch for hinged guards

Mounting

To facilitate alignment of the switch to the post, alignment pins can be inserted into corresponding holes in the bottom of the switch. Alignment pins are supplied with the mounting hole covers.

Dimensions of connection types:

- **TESK...ST...**
- **TESK...L...**

Notes

The connector and cable are fixed to the half containing the contacts (F). This half should be mounted to the housing, with half M mounted to the movable guard door. If half F is mounted to the movable door, torsion and twisting of the connected cable will occur and cause wear on the wires.

Contact variants

- **TESK...22L...**
- **TESK...11L...**
- **TESK...22ST...**
- **TESK...11ST...**
- **TESK...13L...**
- **TESK...02L...**
- **TESK...13ST...**
- **TESK...02ST...**
- **TESK...12L...**
- **TESK...12ST...**

Contact variants: shown with safety guard closed.

Dimensions:

- B = Minimum bending radius of the connection cable
- C = Cable 5-core (B = 29 mm)
- D = Cable 9-core (B = 33 mm)
We make designing your system easy.

Online Product Catalog
www.usa.schmersal.net

Images available online
Every part number page has an Image tab where you can view or download JPG or EPS images of the product, dimensional drawings, switch travel diagrams, or contact diagrams.

The CAD tab also has links to download CAD drawings of the part in many popular program formats, so they can be directly incorporated into CAD systems designs.
Safe switching and monitoring
Command devices with safety function

The control devices of the Schmersal Group always ensure a safe and reliable transmission of the operator’s commands, regardless if safe stopping from dangerous movements or start-up of critical machine functions are concerned. Apart from many special constructive features, these devices have a long life and an intelligent ergonomic construction.

- Pull-wire Emergency-Stop switches
- Emergency-Stop buttons
- Control panel
- Enabling switches
- Safety foot switches
- Two-hand control panels
- Program extensions

For more information, see our online product catalog: www.usa.schmersal.net
Pull-wire Emergency-Stop switches

ZQ 900

Technical data

- Standards: IEC/EN 60947-5-1, IEC/EN 60947-5-5, EN ISO 13850
- Enclosure: zinc die-cast, enameled
- Cover: thermoplastic
- Protection class: IP65, IP67
- suffix N: IP65
- to IEC/EN 60529
- Contact material: silver
- Contact type: 1 NC/1 NO, 2 NC/2 NO, 3 NC/1 NO, 4 NC
- Switching principle: IEC 60947-5-1
- Connection: screw terminals
- Cable section: max. 2.5 mm² (incl. conductor ferrules)
- Cable entry: 3 x M20
- Uimp: 6 kV
- U: 500 V
- Iimp: 6 A
- Utilization category: AC-15, DC-13
- I/E: 4 A / 230 VAC, 1 A / 24 VDC
- Max. fuse rating: 6 A gG D-fuse to DIN EN 60269-1
- Ambient temperature: -25 °C … +70 ºC
- Mechanical life: > 1 million operations
- Indicator lamp: optionally
- Maximum cable length: 75 m (please observe ambient temperature range and wire supports)
- Features: wire pull and breakage detection
- Classification:
  - Standards: EN ISO 13849-1
  - B10d (NC): 100,000
  - Mission time: 20 years
  - MTTF = \frac{B_{10d} \times n_{op}}{0,1 \times n_{op}}
  - \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}

Contact variants

1 NO/1 NC

2 NC

1 NO/3 NC

2 NO/2 NC

4 NC

Note

Recommended cable lengths for pull-wire Emergency-Stop switches in relation to the range of ambient temperature.
At 5 m distance intermediate wire supports are required, see accessories.

Note

The screwed PL-M20-24V indicator lamp must be ordered separately, see accessories.

The protection class for ordering suffix N is IP65 to IEC/EN 60529.
**Pull-wire Emergency-Stop switches**

### Mode of operation

**Legend**
- 1 Not actuated
- 2 Wire pull detection
- 3 Wire breakage detection

### Wire pull and breakage detection

#### One-side operation

**Legend**
- A Position indicator
- B Emergency-stop pushbutton
- C Reset button

### Mounting instructions

**Mounting instructions**

**Legend**
- 1 Wire rope (STQ441-SC)
- 2 Eyebolt (STQ441-EB)
- 3 Spring (RZ-2041)
- 4 Wire clamp (STQ441-CC)
- 5 Tensioner (STQ441-TB)
- 6 Wire thimble (STQ441-TH)
- 7 Shackle (S900-SH)
- 8 Rope tensioner (S900)

As the thimbles are subject to deformation in case of wire pull, the wire should be pulled several times after fitting. After that, the wire must be re-tensioned using the eyebolt or the tensioner.

**Thimble deformation**

For more information, see our online product catalog: www.usa.schmersal.net
Pull-wire Emergency-Stop switches

ZQ 700

• To EN ISO 13850 / IEC 60947-5-5
• Thermoplastic enclosure
• Double insulated ✪
• 2 contacts
• Position indicator
• Large wiring compartment
• 1 cable entry M20
• One tension force for wire lengths up to 10 m
• Reset button
• Twisting of connection ring not possible
• Wire pull and breakage function
• AS-Interface Safety at Work available

Technical data

Standards:
- IEC/EN 60947-5-1
- IEC/EN 60947-5-5
- EN ISO 13850

Enclosure:
- Thermoplastic

Cover:
- Thermoplastic

Protection class:
- IP67 to IEC/EN 60529

Contact material:
- 1 NC/1 NO
- or 2 NC

Switching principle:
- Snap action with positive break NC contacts

Connection:
- Screw terminals

Cable section:
- Max. 2.5 mm² (incl. conductor ferrules)

Cable entry:
- 1 x M20

U_{imp}:
- 6 kV

U_i:
- 500 V

I_{imp}:
- 10 A

Utilization category:
- AC-15, DC-13
- 4 A / 230 VAC
- 4 A / 24 VDC

Max. fuse rating:
- 6 A gG D-fuse

Ambient temperature:
- -25 °C ... +70 °C

Mechanical life:
- > 1 million operations

Maximum cable length:
- 10 m

(please observe ambient temperature range and wire supports)

Features:
- Wire pull and breakage detection

Classification:
- Standards:
  - EN ISO 13849-1

B_{UL} (NC):
- 100,000

Mission time:
- 20 years

MTTF_Bd = \frac{B_{UL}}{0,1 \times n_{op}}

n_{op} = \frac{d_{op} \times h_{op} \times 3600 \, \text{s/h}}{t_{cycle}}

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Replace</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>1 NO/1 NC</td>
<td></td>
</tr>
<tr>
<td>02</td>
<td>2 NC</td>
<td></td>
</tr>
</tbody>
</table>

Recommended cable lengths for pull-wire Emergency-Stop switches in relation to the range of ambient temperature.

At 2 to 5 m distance intermediate wire supports are required, see accessories.
Pull-wire Emergency-Stop switches

Mode of operation

Legend
1. Not actuated
2. Wire pull detection
3. Wire breakage detection

Wire pull and breakage detection

Mounting instructions

Legend
1. Wire rope (STQ441-SC)
2. Eyebolt (STQ441-EB)
3. Spring (RZ-173I)
4. Wire clamp (STQ441-CC)
5. Tensioner (STQ441-TB)
6. Wire thimble (STQ441-TH)
7. Shackles (S900-SH)
8. Rope tensioner (S900)

A. Position indicator
B. Reset button

One-side operation

Mounting instructions

As the thimbles are subject to deformation in case of wire pull, the wire should be pulled several times after fitting.
After that, the wire must be re-tensioned using the eyebolt or the tensioner.

Thimble deformation
Pull-wire Emergency-Stop switches

**T3Z 068**

**Technical data**

- Standards: IEC/EN 60947-5-1, IEC/EN 60947-5-5, EN ISO 13850
- Enclosure: cast iron, enamel finish
- Cover: cast iron, enamel finish
- Protection class: IP65 to EN 60529
- Contact material: change-over contact with double break, max. 3 NO and 3 NC contacts
- Switching principle: IEC 60947-5-1 snap action with positive break NC contacts
- Connection: screw terminals
- Cable section: max. 1.5 mm² (incl. conductor ferrules)
- Cable entry: 2 x M20
- \( U_{\text{imp}} \): 4 kV
- \( U_i \): 250 VAC
- \( I_{\text{nom}} \): 10 A
- Utilization category: AC-15, DC-13
- \( I/\dot{U}_i \): 2.5 A / 230 VAC, 6 A / 24 VDC
- Max. fuse rating: 6 A gG D-fuse
- Positive break torque: 1.8 Nm
- Angle for positive break travel: 32°
- Positive break force: 50 N
- Actuating force: max. 50 N (30 N in direction of rope)
- Ambient temperature: -30 °C … +90 °C
- Mechanical life: 50,000 operations
- Indicator lamp: yellow 230 VAC/5 W, BA 15D screw socket
- Maximum cable length: 2 x 50 m
- Features: wire pull and breakage detection

**Contact variants**

- **1 NO / 1 NC**
  - 11
  - 1 NO / 1 NC
- **2 NO / 2 NC**
  - 21-22
  - 2 NO / 2 NC
  - 33
  - 3 NO / 3 NC
  - 13-14
- **3 NO / 3 NC**
  - 11
  - 1 NO / 1 NC

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Replace</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>11</td>
<td>1NO/1NC</td>
</tr>
<tr>
<td>②</td>
<td>22</td>
<td>2NO/2NC</td>
</tr>
<tr>
<td>③</td>
<td>33</td>
<td>3NO/3NC</td>
</tr>
<tr>
<td>②</td>
<td>S</td>
<td>Pull-ring reset</td>
</tr>
<tr>
<td>③</td>
<td>G</td>
<td>Without indicator lamp</td>
</tr>
<tr>
<td>②</td>
<td>S</td>
<td>Key reset</td>
</tr>
<tr>
<td>③</td>
<td>G</td>
<td>With indicator lamp</td>
</tr>
</tbody>
</table>

**Approvals**

- 

**Note**

At 3 m distance intermediate wire supports are required, see accessories

**Note**

Reset by key
Pull-wire Emergency-Stop switches

System components

| Eyebolt with Nut (STQ441-EB) | BM 10 x 40 | 101084928 |
| BM 8 x 70 (stainless steel) | 101192471 |

| Wire clamp (STQ441-CC) | 5 mm (stainless steel) | 101203478 |
| 3 mm (stainless steel) | 101190917 |
| Egg-shaped wire clamp | 101077072 |

System components

| Wire thimble (STQ441-TH) | 5 mm (stainless steel) | 101203476 |
| 101144547 |

| Pulley (STQ441-PU) (stainless steel) | 101087930 |
| Tensioner M6 (STQ441-TB) |

| Tension spring (STQ441-SS) | RZ-136E (only for T3Z 068) | 101087931 |
| RZ-2041 (only for TQ/ZQ 900) | 101186696 |
| RZ-1731 (only for TQ 700) | 103005863 |

Components identical to image. The dimensions and the design could vary!

System components

| Wire rope (per foot) (STQ441-SC) | on request |
| Wire unit complete | on request |
| Shackle (stainless steel) (S900-SH) | 101186490 |
| Rope tensioner S 900 | 101186704 |
Pull-wire Emergency-Stop switches

System components

Signaling lamp

Adapter plate kit

Ordering details

<table>
<thead>
<tr>
<th>Component</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signaling lamp PL-M20-24V</td>
<td>101150877</td>
</tr>
<tr>
<td>(LED 24 VDC)</td>
<td></td>
</tr>
<tr>
<td>Signaling lamp PL-M20-120V</td>
<td>801000432</td>
</tr>
<tr>
<td>(LED 120 VDC)</td>
<td></td>
</tr>
<tr>
<td>Adapter plate kit</td>
<td>101193805</td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: www.usa.schmersal.net
Emergency-Stop push button

EDRRZ 40 RT

- Metal operator head
- To EN ISO 13850 / IEC 60947-5-5
- Max. 2 NC and 2 NO or 4 NC contacts
- Projection from front of panel 29 mm
- For mounting holes Ø 22.3 mm
- Selection of terminal designations available
- Pull to reset

EDRRS 40 RT

- Reset by key
- To EN ISO 13850 / IEC 60947-5-5

Ordering details

EDRRZ 40 RT

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Z</td>
<td>Pull reset</td>
</tr>
<tr>
<td>1</td>
<td>S</td>
<td>Key reset</td>
</tr>
</tbody>
</table>

Order contact blocks separately:
1 NO / 1 NC contact block, pos. 1
1 NO / 1 NC contact block, pos. 2
2 NC contact block, pos. 1
2 NC contact block, pos. 2
Spring element, for pos. 3

Technical data

Standards: IEC/EN 60947-5-5,
EN ISO 13850
Operators: aluminum
Protection class: IP65 to EN 60529
Contact material: silver
Switching principle: IEC 60947-5-1
slow action
Contact type: change-over contact,
2 NC contacts
combined as desired
Connection: WAGO clip-in terminals on request
Cable section: max. 2.5 mm²
I_{Emin} = 10 A
U_{E} = 400 V
I_{P} / U_{P}: 8 A / 230 VAC
5 A / 24 VDC
Utilization category: AC-15, DC-13
Max. fuse rating: 10 A gG D-fuse
Contact opening: > 2 x 1.25 mm
Bounce duration: < 5 ms at 100 mm/s
Ambient temperature: -25 °C ... +80 °C
(-40 °C on request)
Mechanical life:
- operators: > 100,000 operations
- contact blocks: 10 million operations
Switching frequency: 600/h
Resistance to shock:
- max. 70 g / 4 ms,
- contact block: 110 g / 4 ms
Push button Ø: 38.5 mm
Mounting hole Ø: 22.3 mm
Classification:
Standards: EN ISO 13849-1
B_{iso} (NC): 100,000
Mission time: 20 years

\[
MTTF_{Bd} = \frac{B_{iso}}{0.1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}
\]

Note

Other product variants:
- Diameter 16.2 mm and 30.5 mm
- Different diameters for the actuating heads
- Contact elements with push-on spades and (WAGO cage clamps)
- Optionally also completely mounted

ISO 13850 requires red Emergency Stop buttons be mounted on a yellow background.
For a variety of yellow housings or labels, see "System components" on page 2-13

Other product variants:
- Diameter 16.2 mm and 30.5 mm
- Different diameters for the actuating heads
- Contact elements with push-on spades and (WAGO cage clamps)
- Optionally also completely mounted

Max. 2 NC and 2 NO or 4 NC contacts

Approvals

UL

Note

In order to avoid repeating of the same terminal designations in wiring diagrams, contact blocks with the same contact configuration are available with different terminal designations.
Emergency-Stop push button

NDRR 50 RT

• Thermoplastic operator head
• To EN ISO 13850 / IEC 60947-5-5
• Max. 2 NC and 2 NO or 4 NC contacts
• Projection from front of panel 45 mm
• For mounting holes Ø 22.3 mm
• Selection of terminal designations available
• Pull to reset
• IP69K Rated for high temp, high pressure wash downs.
• Separate spring element EFR needed

NDRZ 50 RT

• Thermoplastic operator head
• To EN ISO 13850 / IEC 60947-5-5
• Max. 2 NC and 2 NO or 4 NC contacts
• Projection from front of panel 45 mm
• For mounting holes Ø 22.3 mm
• Selection of terminal designations available
• Pull to reset
• IP69K Rated for high temp, high pressure wash downs.
• Integrated spring element in device head

Technical data

Standards:
- IEC/EN 60947-5-5
- EN ISO 13850

Operators:
- glass fiber reinforced thermoplastic, self-extinguishing

Protection class:
- IP69K to DIN40050

Contact material:
- silver

Switching principle:
- IEC 60947-5-1
  - slow action

Contact type:
- change-over contact, 2 NC contacts combined as desired

Connection:
- screw terminals
  - WAGO clip-in terminals on request

Cable section:
- max. 2.5 mm²

U<sub>imp</sub>:
- –

I<sub>U</sub>:
- 400 V

U<sub>i</sub>/I<sub>e</sub>:
- 8 A / 230 VAC
  - 5 A / 24 VDC

Utilization category:
- AC-15, DC-13

Max. fuse rating:
- 10 A gG D-fuse

Switching capacity:
- –

Switchover time:
- > 2 x 1.25 mm

Bounce duration:
- < 5 ms at 100 mm/s

Ambient temperature:
- -25 °C ... +80 °C

Mechanical life:
- - operators: > 100,000 operations /
  - contact blocks: 10 million operations

Switching frequency:
- operator: 1,000/h
  - contacts: 2,000/h

Resistance to shock:
- max. 70 g / 4 ms,
  - contact block: 110 g / 4 ms

Push button Ø:
- 50 mm

Mounting hole Ø:
- 22.3 mm

Classification:

Standards:
- EN ISO 13849-1

B<sub>d</sub>(NC): EN ISO 13849-1

Mission time:
- 100,000

MTTF<sub>d</sub>:
- 20 years

Ordering details

<table>
<thead>
<tr>
<th>NDRR 50 RT</th>
<th>Description</th>
<th>No.</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>White sealing bellows</td>
<td>①</td>
<td>GR/</td>
</tr>
<tr>
<td></td>
<td>Black sealing bellows</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Order contact blocks separately:
- 1 NO / 1 NC contact block, pos. 1
- 1 NO / 1 NC contact block, pos. 2
- 2 NC contact block, pos. 1
- 2 NC contact block, pos. 2
- Spring element, for pos. 3

Note

In order to avoid repeating of the same terminal designations in wiring diagrams, contact blocks with the same contact configuration are available with different terminal designations.

Max. 2 NC and 2 NO or 4 NC contacts

SO 13850 requires red Emergency Stop buttons be mounted on a yellow background.

For a variety of yellow housings or labels, see "System components" on page 2-13
Emergency-Stop push button

**RDRZ 45 RT**

- Metal operator head - Aluminum
- To EN ISO 13850 / IEC 60947-5-5
- Max. 2 NC and 2 NO or 4 NC contacts
- Projection from front of panel 27.5 mm
- For mounting holes Ø 22.3 mm
- Selection of terminal designations available
- Pull to reset
- Integrated spring element

**Technical data**

- Standards: IEC/EN 60947-5-5, EN ISO 13850
- Operators: RDRZ: aluminum
  - EX-RDRZ: brass
- Protection class: IP65 to EN 60529
- Contact material: silver
- Switching principle: IEC 60947-5-1
  - Slow action
- Contact type: change-over contact
  - 2 NC contacts combined as desired
- Connection: screw terminals
- Cable section: max. 2.5 mm²
- Iₜₚₚ: 10 A
- Uₑ: 400 V
- Iₑ/Uₑ: 8 A / 230 VAC
  - 5 A / 24 VDC
- Utilization category: AC-15, DC-13
- Max. fuse rating: 10 A gG D-fuse
- Contact opening: > 2 x 1.25 mm
- Bounce duration: < 5 ms at 100 mm/s
- Ambient temperature: -25 °C ... +75 °C
- Mechanical life: > 100,000 operations
- - operators: 1,000 h
  - contacts: 1,200 h
- Resistance to shock: max. 70 g / 4 ms
  - contact block: 110 g / 4 ms
- Push button Ø: 38.5 mm
- Mounting hole Ø: 22.3 mm
- Classification:
  - Standards: EN ISO 13849-1
  - B₁₀d (NC): 100,000
  - Mission time: 20 years

**Approvals**

**Ordering details**

**RDRZ 45 RT**

- Contact blocks: 1 NO contact block, terminals 3, 4
  - RF03
- 1 NO contact block, terminals 13, 14
  - RF03.1
- 1 NC contact block, terminals 1, 2
  - RF10
- 1 NC contact block, terminals 11, 12
  - RF10.1

**EX-RDRZ 45 RT**

- Contact blocks: 1 NO contact block, terminals 3, 4
  - EX-RF03
- 1 NO contact block, terminals 13, 14
  - EX-RF03.1
- 1 NC contact block, terminals 1, 2
  - EX-RF10
- 1 NC contact block, terminals 11, 12
  - EX-RF10.1

**Note**

In order to avoid repeating of the same terminal designations in wiring diagrams, contact blocks with the same contact configuration are available with different terminal designations.

Max. 2 NC and 2 NO or 4 NC contacts

ISO 13850 requires red Emergency Stop buttons be mounted on a yellow background. For a variety of yellow housings or labels, see "System components" on page 2-13.
Emergency-Stop push button

**KDRRKZ 40 RT**

- Thermoplastic operator head
- To EN ISO 13850 / IEC 60947-5-5
- Max. 2 NC and 2 NO or 4 NC contacts
- Projection from front of panel 29 mm
- For mounting holes Ø 22.3 mm
- Selection of terminal designations available
- Pull to reset

## Technical data

**Standards:**
- IEC/EN 60947-5-5
- EN ISO 13850

**Operators:**
- Glass fiber reinforced thermoplastic, self-extinguishing

**Protection class:**
- IP65 to EN 60529

**Contact material:**
- Silver

**Switching principle:**
- IEC 60947-5-1
- Slow action

**Contact type:**
- Change-over contact
- 2 NC contacts combined as desired

**Connection:**
- Screw terminals

### Cable section:
- Max. 2.5 mm²

### Standards:

- EN ISO 13849-1
- B10d
- (NC): 100,000

### Mission time:
- 20 years

### Classification:

**Standards:**
- EN ISO 13849-1

**B_10 (NC):**
- 100,000

### Contact variants

**1 NO / 1 NC**

- **EF 303.1**
  - 31 / 32
  - 41 / 42

**2 NO**

- **EF 220.1**
  - 21 / 22

**2 NC**

- **EF 220.2**
  - 31 / 32
  - 41 / 42

### Note

In order to avoid repeating of the same terminal designations in wiring diagrams, contact blocks with the same contact configuration are available with different terminal designations.

Max. 2 NC and 2 NO or 4 NC contacts

## Approvals

![CE](image)

## Ordering details

### KDRRKZ 40 RT

Order contact blocks separately:
- 1 NO / 1 NC contact block, pos. 1
- 1 NO / 1 NC contact block, pos. 2
- 2 NC contact block, pos. 1
- 2 NC contact block, pos. 2
- Spring element, for pos. 3

### Contact variants

**EF 303.1**

- 31 / 32
- 41 / 42

**EF 303.2**

- 31 / 32
- 41 / 42

**EF 220.1**

- 21 / 22

**EF 220.2**

- 31 / 32
- 41 / 42

**EFR**

### Note

Other product variants:
- Diameter 16.2 mm and 30.5 mm
- Different diameters for the actuating heads
- Contact elements with push-on spades and (WAGO cage clamps)
- Optionally also completely mounted

ISO 13850 requires red Emergency Stop buttons be mounted on a yellow background. For a variety of yellow housings or labels, see "System components" on page 2-13.
Emergency-Stop push button

**ADRR 40 RT**

- Thermoplastic operator head
- To EN ISO 13850 / IEC 60947-5-5
- Max. 6 contacts in tandem arrangement
- For mounting holes Ø 22.3 mm
- Pull to reset

### Technical data

- **Standards:** IEC/EN 60947-5-5
- **Protection class:** IP65 to EN 60529
- **Contact material:** silver
- **Switching principle:** slow action
- **Contact type:** NO and NC contacts, combined as desired
- **Connection:** screw terminals
- **Cable section:** max. 2.5 mm² (incl. conductor ferrules)
- **U.imp:** 6 kV
- **U.c:** 400 V
- **I.imp:** 10 A
- **I.c/230 V:** 8 A / 230 VAC
- **5 A / 24 VDC**
- **Utilization category:** AC-15, DC-13
- **Max. fuse rating:** 10 A gG D-fuse
- **Switching frequency:** 600/h
- **Resistance to shock:** 50 g / 20 ms
- **Push button Ø:** 40 mm
- **Mounting hole Ø:** 22.3 mm

### Classification:

- **Standards:** EN ISO 13849-1
- **B₁₀d:** EN ISO 13849-1
- **Mission time:** 100,000
- **Mission time:** 20 years

### Approvals

- CE

### Ordering details

**ADRR 40 RT**

- Contact blocks:
  - 1 NO contact block, terminals 3, 4: RF03
  - 1 NO contact block, terminals 13, 14: RF03.1
  - 1 NC contact block, terminals 1, 2: RF10
  - 1 NC contact block, terminals 11, 12: RF10.1

### Note

Max. 6 contacts in tandem arrangement

ISO 13850 requires red Emergency Stop buttons be mounted on a yellow background. For a variety of yellow housings or labels, see “System components” to right

### System components

- **Empty enclosure MBK 311/GB**
- **Empty enclosure MBGAC 311/GB**
- **Emergency-Stop plate & labels**

### Ordering details

**Empty enclosure**

- Thermoplastic, yellow cover: MBK 311/GB
- Metal, yellow cover: MBGAC 311/GB
- Stainless steel (IP69K): NBG311

**Emergency-Stop plate (yellow)**

- Aluminum: MDP-8
- Thermoplastic: MDP-8.1

**Yellow label**

- 70 mm, metal, blank: NDP-70
- 70 mm, metal, “EMERGENCY STOP”: NDP-70/ES
- 65 mm, plastic foil: NDP-65

For more information, see our online product catalog: www.usa.schmersal.net
BDF control panel

BDF 100 ...-NH

- Yellow enclosure cover
- Slim, shock-resistant plastic enclosure
- Can be fitted onto customary aluminum profile systems
- Can be installed in the most favorable ergonomic position
- Emergency stop function with or without protective collar
- Two-layer plastic identification labels can be used (engravings on request)

BDF 100

- Black enclosure cover
- Comprehensive selection of illuminated pushbuttons, selector switches, signalling devices with LED and key-operated switches
- Start/stop and reset functions available

Technical data

Standards:
EN 60947-5-1, EN 60947-5-5

Enclosure:
Enclosure material: glass fiber reinforced thermoplastic, self-extinguishing
Enclosure protection class: IP65
Connection: connector M12, 8-pole

Ambient conditions:
Ambient temperature: -25 °C ... +65 °C
Climatic resistance: to DIN EN 60068, Part 2 - 30

Overvoltage category: III
Degree of pollution: 3

Contact elements:
Contact material: AgNi 10, gold-plated
Control elements - protection class: IP65
Rated operating voltage $U_r$: max. 24 V
Utilization category: AC-15/DC-13
Rated operating current/voltage $I_{e}/U_{e}$:
- AC-15: 2 A / 24 VAC
- DC-13: 1 A / 24 VDC

Thermal test current $I_{th}$: 2 A
Fuse rating: 2 A slow-blow
Contact system: cross-point system
Contact force: 0.5 N per contact point $= 1$ N per contact

Switching of low voltages:
- min. 5 V / 1 mA

Switching frequency: 1,200 s/h
Rated insulation voltage $U_i$: 60 V
Bounce time: < 2 ms at 100 mm/s operating speed

Mech. lifetime:
- emergency stop: 100,000 operations
Switch travel: approx. 3 mm

Resistance to shocks: 100 g / 6 ms
Resistance to vibrations: 20 g, 10 ... 100 Hz
Wiring labels: to EN 60947-1
Actuating force at end of travel (1NC/1NO): 8 N

Approvals

Ordering details

BDF 100-➀-G-ST with emergency stop

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>NH</td>
<td>Emergency stop latching pushbutton without protective collar</td>
</tr>
<tr>
<td></td>
<td>NHK</td>
<td>with protective collar</td>
</tr>
</tbody>
</table>

BDF 100-➀-②-③-ST

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>20</td>
<td>2 NO contacts</td>
</tr>
<tr>
<td>②</td>
<td>11</td>
<td>1 NO contact / 1 NC contact</td>
</tr>
<tr>
<td>③</td>
<td>…</td>
<td>Selection of the actuator without indicator lamp</td>
</tr>
<tr>
<td></td>
<td>G/RD</td>
<td>Red indicator lamp *</td>
</tr>
<tr>
<td></td>
<td>G/GN</td>
<td>Green indicator lamp *</td>
</tr>
<tr>
<td></td>
<td>G/YE</td>
<td>Yellow indicator lamp *</td>
</tr>
<tr>
<td></td>
<td>G/BU</td>
<td>Blue indicator lamp *</td>
</tr>
<tr>
<td></td>
<td>G/WH</td>
<td>White indicator lamp *</td>
</tr>
</tbody>
</table>

Note

Example: BDF 100-NHK-G-ST
BDF 100-11-LTWH-ST

The description of the suitable control elements can be found on page 2-16

* not for -LT, -LM

For more information, see our online product catalog: www.usa.schmersal.net
BDF control panel

Technical data

Illuminated pushbuttons:
Enclosure material: glass fiber reinforced thermoplastic, self-extinguishing
Illuminated pushbutton material: all-insulated
Front collar material: plastic
Calotte material: plastic
Illuminated pushbutton - protection class: IP65
Rated operating voltage $U_r$: max. 24 V
Fuse rating: 2.5 A slow-blow
Rated insulation voltage $U_i$: 60 V
Lamp values illuminated pushbutton:
Lamp fitting: Ba5S
LED replacement: from front
LED power consumption (actuators): 16 mA
Power consumption indicator lamp, red: 20 mA

Safety classification emergency stop:
Standards: EN ISO 13849-1
$B_{10d}$: 100,000
Mission time: 20 years

$\text{MTTF}_{d} = \frac{B_{10d}}{0.1 \times n_{op}}$ $n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{1 \text{ cycle}}$

Contact variants

Emergency stop -
1 NO / 2 NC contacts

2 NO contacts (-20)

1 NO / 1 NC contact (-11)

Ordering details

Connection Cables: M12, 8-pole
Cable length 5 m 103011412
Cable length 10 m 103011413

Note

Contact symbols shown in non-actuated condition

Note

Pin configuration of the connector indicated between brackets
### BDF control panel, available operators

#### NH / NHK
- **Emergency stop latching pushbutton**
- Mushroom-shaped plastic pushbutton, Ø 30 mm
- Pull to reset
- 1 NO contact / 2 NC contacts
- Without protective collar: ordering suffix NH
- With protective collar: ordering suffix NHK
- For BDF200: position 1 only

#### DT..
- **Pushbutton**
  - With concave button
  - Contact surface 19 x 19 mm
  - 2 NO contacts or 1 NO/1 NC contact
  - Available in 6 different colors
  - Prints on device on request
  - Ordering suffix, refer to table below
  - For BDF200: position 1, 2, 3, and/or 4

#### LT..
- **Illuminated pushbutton**
  - With concave button
  - Contact surface 19 x 19 mm
  - 2 NO contacts or 1 NO/1 NC contact
  - Lamp replacement from front
  - Available in 5 different colors
  - Prints on device on request
  - Ordering suffix, refer to table below
  - For BDF200: position 1, 2, 3, and/or 4

#### LM..
- **Signaling device**
  - Illuminated surface 19 x 19 mm
  - Lamp replacement from front
  - Available in 5 different colors
  - Prints on device on request
  - Ordering suffix, refer to table below
  - For BDF200: position 1, 2, 3, and/or 4

#### PT..
- **Mushroom-shaped pushbutton**
  - Contact surface 25 x 25 mm with rounded sides
  - Not latching
  - 2 NO contacts or 1 NO/1 NC contact
  - Available in 6 different colors
  - Prints on device on request
  - Ordering suffix, refer to table below
  - For BDF200: position 1, 2, 3, and/or 4
  - Not available for BDF100

#### Note
- Control panel BDF200
- Position 1
- Position 2
- Position 3
- Position 4
- Wiring compartment

<table>
<thead>
<tr>
<th>Suffix</th>
<th>yellow</th>
<th>red</th>
<th>green</th>
<th>blue</th>
<th>black</th>
<th>white</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mushroom-shaped pushbutton PT..</td>
<td>PTYE</td>
<td>PTRD</td>
<td>PTGN</td>
<td>PTBU</td>
<td>PTBK</td>
<td>PTWH</td>
</tr>
<tr>
<td>Pushbutton DT..</td>
<td>DTYE</td>
<td>DTRD</td>
<td>DTGN</td>
<td>DTBU</td>
<td>DTBK</td>
<td>DTWH</td>
</tr>
<tr>
<td>Illuminated pushbutton LT..</td>
<td>LTYE</td>
<td>LTRD</td>
<td>LTGN</td>
<td>LTBU</td>
<td></td>
<td>LTWH</td>
</tr>
<tr>
<td>Signaling device LM..</td>
<td>LMYE</td>
<td>LMRD</td>
<td>LMGN</td>
<td>LMBU</td>
<td></td>
<td>LMWH</td>
</tr>
</tbody>
</table>
BDF control panel, available operators

- Selector switch
  Maintained or Spring-return, 2 or 3 position
  - Version with standard knob, anthracite grey
  - Ordering suffix, refer to table below
  - For BDF200: position 2 and/or 3 only

- Selector switch with extended knob
  Maintained or Spring-return, 2 or 3 position
  - Version with long knob, anthracite grey
  - Ordering suffix, refer to table below
  - For BDF200: position 2 and/or 3 only
  - Not available on BDF100

- Key-operated selector switch /
  Maintained or Spring-return, 2 position
  - Version with high-grade cylinder lock, therefore IP65 as well
  - Ordering suffix, refer to table below
  - For BDF200: position 2 and/or 3 only

<table>
<thead>
<tr>
<th>Ordering suffix</th>
<th>Selector switch</th>
<th>Selector switch</th>
<th>Spring-return</th>
<th>Spring-return</th>
<th>Selector switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 latching position</td>
<td>2 latching positions left and right of the zero position</td>
<td>1 touch position and automatic return to the zero position</td>
<td>2 touch positions left and right of the zero position and automatic return to the zero position</td>
<td>1 touch position right and automatic return to the zero position + 1 latching position left of the zero position</td>
<td></td>
</tr>
<tr>
<td>2 NO contacts or 1 NO/1 NC contact</td>
<td>1 NO contact for each switching position or 1 NC contact (position 1) and 1 NO contact (position 2)</td>
<td>2 NO contacts or 1 NO/1 NC contact</td>
<td>1 NO contact for each switching position or 1 NC contact (position 1) and 1 NO contact (position 2)</td>
<td>1 NO contact for each switching position or 1 NC contact (position 1) and 1 NO contact (position 2)</td>
<td></td>
</tr>
</tbody>
</table>

- Standard knob
  - WS20
  - WS30
  - WT20
  - WT30
  - WTS30

- Long knob
  - WS21
  - WS31
  - WT21
  - WT31
  - WTS31

- Key-operated switch
  - SWS20
  - SWT20
BDF control panel

BDF 200...-2875

- Slim, shock-resistant plastic enclosure
- Can be fitted onto customary aluminum profile systems
- Can be installed in the most favorable ergonomic position
- Comprehensive selection of illuminated pushbuttons, selector switches, signalling devices with LED, key-operated switches and emergency stop switches/pushbuttons
- Emergency stop, start/stop and reset functions available
- The position of the switch/pushbutton on the control panel can be chosen
- Two-layer plastic identification labels can be used (engravings on request)
- AS-Interface Safety at Work available
- Universal kit model (-2875) for field customization

Approvals

Ordering details

BDF 200...-2875 Preferred part designations

<table>
<thead>
<tr>
<th>Series</th>
<th>Fitting at Pos. 1</th>
<th>Pos. 2</th>
<th>Pos. 3</th>
<th>Pos. 4</th>
<th>Indicator lamp</th>
<th>Type designation</th>
<th>Material number</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH</td>
<td>LT</td>
<td>LT</td>
<td>LT</td>
<td>red</td>
<td>BDF200-NH-10-LT-LT-G24-2875 103007781</td>
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<td></td>
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<td>LT</td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>LT</td>
<td>LT</td>
<td>LT</td>
<td></td>
<td>BDF200-NH-20-LT-LT-LT-2875 103007783</td>
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<td></td>
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<tr>
<td></td>
<td>SWS20</td>
<td>LT</td>
<td>LT</td>
<td></td>
<td>BDF200-NH-11-SWS20-LT-LT-2875 103007789</td>
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<td></td>
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<tr>
<td></td>
<td>SWS20</td>
<td>LT</td>
<td>LT</td>
<td></td>
<td>BDF200-NH-20-SWS20-LT-LT-2875 103007790</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>LT</td>
<td>LT</td>
<td>LT</td>
<td>red</td>
<td>BDF200-NKH-10-LT-LT-G24-2875 103007784</td>
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<td></td>
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<tr>
<td>NHK</td>
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<td>LT</td>
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<td>BDF200-NHK-11-LT-LT-LT-2875 103007785</td>
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<td></td>
</tr>
<tr>
<td></td>
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<td>LT</td>
<td>LT</td>
<td></td>
<td>BDF200-NHK-11-SWS20-LT-LT-2875 103007791</td>
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<td></td>
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<tr>
<td></td>
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<td></td>
<td>BDF200-LT-20-LT-LT-LT-2875 103007788</td>
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<td></td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: www.usa.schmersal.net
**BDF control panel**

### NH
- Emergency stop latching pushbutton
- Yellow housing without protective collar
- Red mushroom-shaped plastic pushbutton, 30 mm Ø
- Pull to reset
- 1 NO contact / 2 NC contacts

### NHK
- Emergency stop latching pushbutton
- Yellow housing with protective collar
- Red mushroom-shaped plastic pushbutton, 30 mm Ø
- Pull to reset
- 1 NO contact / 2 NC contacts

### SWS20
- Key-operated selector switch,
- 2 position, maintained
- High-grade cylinder lock, IP65

---

**LT**

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field customizable button/signal:</td>
</tr>
<tr>
<td><strong>For pushbutton</strong></td>
</tr>
<tr>
<td>- Wire only the contacts for the position</td>
</tr>
<tr>
<td>- Apply opaque button, in color of choice</td>
</tr>
<tr>
<td><strong>For illuminated pushbutton</strong></td>
</tr>
<tr>
<td>- Wire the contacts and LED for the position</td>
</tr>
<tr>
<td>- Apply transparent button, in color of choice</td>
</tr>
<tr>
<td><strong>For signal light</strong></td>
</tr>
<tr>
<td>- Wire only the LED for the position</td>
</tr>
<tr>
<td>- Apply transparent button, in color of choice</td>
</tr>
</tbody>
</table>

---

**Accessories**

### AZM200 Solenoid Interlock
- BDF200 housing matches the AZM200 housing
- A available with door handle actuator -B30
- For more information, see page 1-54

### MP BDF 200
- Mounting plates
- For side by side mounting of BDF200 control panel and AZM200 solenoid interlock with -B30 actuator

### BDF-U200-PBC
- Set of Pushbutton Caps, various styles/colors:
  - Solid: blue, green, yellow, red, white, black
  - Transparent: blue, green, yellow, red, white
- For all "LT" positions of -2875 models.
- Included with initial delivery of -2875 models
BDF control panel

**BDF 200-NH-11-...**

1 NO / 2 NC contacts
for emergency stop at Pos. 1

1 NO / 1 NC contact
for operating elements at Pos. 2 - 4

**Terminal configuration**

![Terminal configuration diagram]

**BDF 200-NH-20-...**

1 NO / 2 NC contacts
for emergency stop at Pos. 1

2 NO contacts
for operating elements at Pos. 2 - 4

**Terminal configuration**

![Terminal configuration diagram]

**BDF 200-NH-10-...**

2 NC contacts
for emergency stop at Pos. 1
and indicator lamp (red)

1 NO contact
for operating elements at Pos. 2 - 4
and indicator lamp (red)

**Terminal configuration**

![Terminal configuration diagram]
BDF control panel

**BDF 200-...-11-...**

1 NO / 1 NC contact
for operating elements at Pos. 1 - 4

**BDF 200-...-20-...**

2 NO contacts
for operating elements at Pos. 1 - 4

**BDF 200-...-10-...**

1 NO contact
for operating elements at Pos. 1 - 4
and indicator lamp (red)
Enabling switch

**ZSD 5**

- Thermoplastic enclosure
- 3 levels OFF-ON-OFF
- Good resistance to petroleum spirit and oil
- 2 NO contacts
  - 1 auxiliary contact (NC contact) (level 2 -> level 1)
  - Contacts do not close upon reset (level 3 -> level 1)
- Positive break (level 2 -> level 3)
- The redundant contact configuration enables signal evaluation with common safety relay modules
- Particularly fit for robot applications in accordance with the ANSI Robotics Standard

**ZSD 6**

- Supplementary push-button in device head
  - 1 NO contact (ZSD 6)
- Other product variants and details can be found on the end of this chapter.

**Technical data**

| Standards:          | IEC/EN 60947-5-1; |
|                     | IEC/EN 60204-1;   |
|                     | EN 292;           |
|                     | ISO 12100;        |
|                     | ISO 11161;        |
|                     | ISO 10218;        |
|                     | EN 775            |
| Enclosure:          | thermoplastic, self-extinguishing |
| Protection class:   | IP65 to EN 60529  |
| Contact material:   | silver            |
| Contact type:       | 2 NO / 1 NC       |
|                     | (ZSD 6: + 1 NO)   |
| Switching principle:| IEC 60947-5-1;    |
|                     | slow action,      |
|                     | NC contacts with positive break |
| Connection:         | screw terminals   |
| Cable section:      | min. 0.14 mm²     |
|                     | max. 1.5 mm²      |
|                     | (incl. conductor ferrules) |
| Cable entry:        | 1 x M20           |
| U_in:               | 2.5 kV            |
| U_e:                | 125 V             |
| Utilization category:| AC-12, DC-12     |
| I_p/U_e:            | 0.5 A / 24 VAC    |
|                     | 1 A / 24 VDC      |
| Max. fuse rating:   | 3 A gG D-fuse     |
| Positive break travel: | 7.4 mm          |
| Ambient temperature:| -10 °C ... +60 °C |
| Mechanical life:    | > 100,000 operations |
| Switching frequency:| max. 1200/h       |
| Classification:     | EN ISO 13849-1    |
| Standards:          | EN ISO 13849-1    |
| B_100 (NC):         | 100,000           |
| Mission time:       | 20 years          |

**Approvals**

![CE logo]

**Ordering details**

<table>
<thead>
<tr>
<th>ZSD</th>
<th>No.</th>
<th>Replace</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>5</td>
<td>Replace</td>
<td>3-stage door handle</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td></td>
<td>3-stage door handle switch with additional push button in the device head</td>
</tr>
</tbody>
</table>

**Note**

Customer-specific designs, with pre-wired cable, or other signalling and command devices in the device head available on request.

**Note**

The monitoring module must offer the possibility of cross-wire monitoring. To connect, only use shielded pre-wired cables (see drawing).
Enabling switch

System components

Wiring diagram

Legend for the wiring diagram
1 Automatic mode
2 Set-up mode
3 Channel 1
4 Channel 2
5 Jog key

Note
Evaluation of an enabling switch of the ZSD 5/ZSD 6 series by means of a safety-monitoring module of the SRB series, 2-channel with cross-wire detection.

- Jog key control (optional) to start the machine in jog mode
- Superposed evaluating module monitors the emergency stop position of the push-button
- External switch-over from automatic to set-up mode required

Ordering details
Mounting angle ZSD-H

Mounting angle ZSD-H
Safety foot switches

TFH 232-..UEDR

• Safety-related function with overlapping contacts, pressure point and latching
• 2 or 4 contacts
• Metal enclosure
• Protective shield with wide opening
• Low pedal height
• High level of stability
• Cable entry M20

T2FH 232-..UEDR

• 4, 6 or 8 contacts
• 2 cable entries M25

Technical data

Standards:
- IEC/EN 60947-5-1
- DIN VDE 0660-200
- BG-GS-ET-15

Material of the enclosure, cover and protective shield: aluminum die-cast
Housing coating: powder-coated
Material of the pedal: glass fiber reinforced thermoplastic

Mechanical data

Design of electrical connection: screw terminals
- Max. cable section: max. 2.5 mm² (incl. conductor ferrules)
Cable entry:
- 1-pedal: 1 x M20
- 2-pedal: 2 x M25
Mechanical life: > 1 million operations
Switching frequency: max. 1 /s
Resistance to shock: 30 g / 11 ms
Resistance to vibration: 10 ... 150 Hz (0.35 mm / 5 g)

Ambient conditions

Ambient temperature: -25 °C...+60 °C
Storage and transport temp.: -25 °C...+85 °C
Relative humidity:
- 30% ... 95% - non-condensing
- 95% - non-icing

Protection class: IP65 to IEC/EN 60529
Overvoltage category: III
Degree of pollution: 3

Electrical data

Design of the switching element: NC, NO
Switching principle: slow action
Rated impulse withstand voltage \( U_{imp} \): 800 V
Rated insulation voltage \( U_i \): 32 VDC
Thermal test current \( I_{th} \): 10 A
Utilization category:
- DC-13: 24 V / 1 A
- AC-15: 230 V / 4 A
Required rated short-circuit current: 1000 A
Max. fuse rating: 6 A gG D-Sicherung
Dimensions:
- 1-pedal: 170 x 189 x 274 mm
- 2-pedal: 295 x 189 x 274 mm

Safety classification

Standards:
- EN ISO 13849-1

B_{tot} (NC contact): 100,000
Service life: 20 years

Approvals

Ordering details

TFH 232-➀

<table>
<thead>
<tr>
<th>No.</th>
<th>Replace</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11UEDR</td>
<td>1 NO/1 NC contact</td>
<td></td>
</tr>
<tr>
<td>22UEDR</td>
<td>2 NO/2 NC contact</td>
<td></td>
</tr>
</tbody>
</table>

T2FH 232-➀

<table>
<thead>
<tr>
<th>No.</th>
<th>Replace</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11UEDR/11UEDR</td>
<td>2 NO/2 NC contact</td>
<td></td>
</tr>
<tr>
<td>22UEDR/22UEDR</td>
<td>4 NO/4 NC contact</td>
<td></td>
</tr>
<tr>
<td>11/22UEDR</td>
<td>3 NO/3 NC contact</td>
<td></td>
</tr>
<tr>
<td>22UEDR/11</td>
<td>3 NO/3 NC contact</td>
<td></td>
</tr>
</tbody>
</table>

Mode of operation -UEDR

0 not actuated → no authorised operation
1 actuated up to pressure point → safety release
2 pushed-through → no authorised operation
unlock → no authorised operation *

For more information, see our online product catalog: www.usa.schmersal.net
Safety foot switches

Contact variants

1-pedal
1 NO / 1 NC
(TFH 232-11UEDR)

2 NO / 2 NC
(TFH 232-22UEDR)

2-pedal
2 NO / 2 NC
(T2FH 232-11UEDR/11UEDR)

4 NO / 4 NC
(T2FH 232-22UEDR/22UEDR)

3 NO / 3 NC
(T2FH 232-11/22UEDR)

3 NO / 3 NC
(T2FH 232-22UEDR/11)

Legend

⊕ positive break NC contact
L left pedal
R right pedal

Note
The non-safety-related pedal of the 2-pedal safety foot switch does not have the overlapping and latching functions.
Two-hand control panels

**SEPK**

- Thermoplastic enclosure
- 2 black operating push buttons Ø 55 mm each with 1 NC and 1 NO contacts according to EN 574
- 1 Emergency-Stop button in thermoplastic version, KDRRKZ 40 RT, with 1 NC and 1 NO contact
- 8 knockouts for additional operating devices Ø 22.3 mm
- Stand and wall mounting possible
- 2 part enclosure
- Protection class IP64

**Technical data**

- Standards: IEC/EN 60947-5-5, EN 574, EN ISO 13850
- Enclosure: Thermoplastic (Lexan 503 R)
- Protection class: IP64
- Connection: Screw terminals
- Cable section: max. 1.5 mm²
- Uᵣ: 440 V
- Iᵣ: 10 A
- Utilization category: AC-15, DC-13
- Iᵣ/Uᵣ: 8 A / 250 VAC, 5 A / 24 VDC
- Mechanical life: 10 million operations
- Dimensions: 469 x 185 x 140 mm
- Classification:
  - Standards: EN ISO 13849-1; IEC 61508; IEC 60947-5-3
  - PL: up to e
  - Category: up to 4
  - PFH value: 5.0 x 10⁻⁹/h up to max. 100,000 switching cycles/year and max. 40% contact load
  - SIL: up to 3 in combination with safety monitoring module
- Mission time: 20 years

**System components**

- **SRB 201ZH**
- **SRB 301HC/R**
- **SRB-E-201-ST**
- **SRB-E-402ST**

**Approvals**

**Ordering details**

**Standard: SEPK 02.0.4.0.22/95**

- 1NO/1NC per button
- 1NO/1NC for Emergency-Stop

**Empty enclosure: SEPK 02.0.L.22**

with 3 mounting holes

**Note**

Customer-specific designs (also entirely pre-wired, special colors, etc.) available on request

Safety distance calculation:

\[ S = (K \times T) + C \]

Legend:

- K = Gripping speed = 1,600 mm/s
- T = Run-on time in seconds
- C = Additional value = 250 mm

**Ordering details**

Safety monitoring modules for two-hand control circuits:

- SRB 201ZH refer to page 2-28
- SRB 301HC/R refer to page 3-14
- SRB-E-201-ST refer to page 5-8
- SRB-E-402ST refer to page 5-14

See Section 5 for details on safety controllers
Two-hand control panels

SEPG

- Aluminum enclosure
- 2 black operating push buttons Ø 55 mm each with 1 NC and 1 NO contacts according to EN 574
- 1 Emergency-Stop button in metal version, EDRRZ 40 RT, with 1 NC and 1 NO contact
- Control panel suitable for mounting 8 supplementary signalling and command devices
- Stand and wall mounting possible
- 2 part enclosure
- Protection class IP65

Technical data

| Standards: | IEC/EN 60947-5-5
| EN 574
| EN ISO 13850
| Enclosure: | Cast aluminum, powder-coated
| Protection class: | IP65
| Connection: | Screw terminals
| Cable section: | max. 1.5 mm²
| Uₚ: | 440 V
| Iₚ: | 10 A
| Utilization category: | AC-15, DC-13
| Iₑ/Uₑ: | 8 A / 250 VAC
| 5 A / 24 VDC
| Mechanical life: | 10 million operations
| Dimensions: | 494 x 184 x 160 mm
| Classification:
| Standards: | EN ISO 13849-1; IEC 61508;
| IEC 60947-5-3
| PL: | up to e
| Category: | up to 4
| PFH value: | 5.0 x 10⁹/h
| up to max. 100,000 switching cycles/year and max. 40% contact load
| SIL: | up to 3 in combination with safety monitoring module
| Mission time: | 20 years

Approvals

Ordering details

<table>
<thead>
<tr>
<th>Standard: SEPG 05.3.4.0.22/95.E1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1NO/1NC per button</td>
</tr>
<tr>
<td>1NO/1NC for Emergency-Stop</td>
</tr>
<tr>
<td>Empty enclosure: SEPG 05.3.L.22</td>
</tr>
</tbody>
</table>

Note

Customer-specific designs (also entirely pre-wired, special colors, etc.) available on request

Safety distance calculation:

| S = (K x T) + C |

Legend:

| K = Gripping speed = 1,600 mm/s |
| T = Run-on time in seconds     |
| C = Additional value = 250 mm   |

System components

| SRB 201ZH |
| SRB 301HC/R |
| SRB-E-201-ST |
| SRB-E-402ST |

Ordering details

Safety monitoring modules for two-hand control circuits:

| SRB 201ZH | refer to page 2-28 |
| SRB 301HC/R | refer to page 3-14 |
| SRB-E-201-ST | refer to page 5-8 |
| SRB-E-402ST | refer to page 5-14 |

See Section 5 for details on safety controllers
Two-hand control panels

SRB 201ZH

Monitoring two-hand control panels to EN 574 III C
- 2 safety contacts, STOP 0
- 1 auxiliary NC contact
- With feedback circuit
- With electronic protection
- 2 LEDs to show operating conditions
- Plug-in screw terminals

### Technical data

**Standards:** IEC/EN 60204-1, EN 60947-5-1, EN ISO 13849-1, IEC 61508

**Feedback circuit (Y/N):** yes

**ON delay with automatic start:** typ. 50 ms

**Drop-out delay:** typ. 30 ms

**Rated operating voltage \( U_z \):** 24 VDC -15%+10% residual ripple max. 10%

**Fuse rating for the operating voltage:** Internal electronic trip, tripping current \( F1/F2: > 0.2 \, \text{A}, \) tripping current \( F3: > 0.6 \, \text{A} \)

**Internal electronic protection (Y/N):** yes

**Power consumption:** 1.2 W

**Monitored inputs:**
- Short-circuit recognition: yes
- Wire breakage detection: yes
- Earth connection detection: yes
- Number of NC contacts: 2
- Number of NO contacts: 2
- Max. conduction resistance: max. 40 Ω

**Outputs:**
- Stop category: 0
- Number of safety contacts: 2
- Number of auxiliary contacts: 1
- Max. switching capacity of the safety contacts: 250 VAC, 6 A resistive (inductive in case of appropriate protective wiring); min. 10 V, 10 mA

**Utilization category to EN 60947-5-1:** AC-15; DC-13

**Fuse rating of the safety contacts:** 6.3 A slow blow

**Fuse rating of the auxiliary contacts:** 2 A slow blow

**Mechanical life:** 10 million operations

**Ambient conditions:**
- Ambient temperature: -25 °C … +45 °C
- Storage and transport temperature: -40 °C … +85 °C
- Protection class: Enclosure: IP40, Terminals: IP20, Clearance: IP54
- Mounting: Snaps onto standard DIN rail to EN 60715
- Connection type: Screw terminals, plug-in
- - min. cable section: 0.25 mm²
- - max. cable section: 2.5 mm²
- Weight: 200 g
- Dimensions (Height x Width x Depth): 120 x 22.5 x 121 mm

**Classification**

**Safety parameters:**
- Standards: EN ISO 13849-1, IEC 61508, EN 60947-5-1
- PL: STOP 0: up to e
- Category: STOP 0: up to 4
- PFH value: STOP 0: ≤ 2.00 x 10⁻⁸/h
- SIL: STOP 0: up to 3
- Mission time: 20 years

The PFH value of 2.00 x 10⁻⁸/h applies to the combinations of contact load (current through enabling contacts) and number of switching cycles (n-op/y) mentioned in the table below.

At 365 operating days per year and a 24-hours operation, this results in the below-mentioned switching cycle times (t-cycle) for the relay contacts. Diverging applications upon request.

<table>
<thead>
<tr>
<th>Contact load</th>
<th>n-op/y</th>
<th>t-cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 %</td>
<td>525,600</td>
<td>1.0 min</td>
</tr>
<tr>
<td>40 %</td>
<td>210,240</td>
<td>2.5 min</td>
</tr>
<tr>
<td>60 %</td>
<td>75,087</td>
<td>7.0 min</td>
</tr>
<tr>
<td>80 %</td>
<td>30,918</td>
<td>17.0 min</td>
</tr>
<tr>
<td>100 %</td>
<td>12,223</td>
<td>43.0 min</td>
</tr>
</tbody>
</table>

### Approvals

Electrical approval mark (UL), CE

### Ordering details

SRB 201ZH-24VDC

For more information, see our online product catalog: www.usa.schmersal.net
Two-hand control panels

Note

- Button A and B: 1 NC contact / 1 NO contact (note: the NC contact of the buttons A and B must be opened, before the NO contact closes. No overlapping contacts to avoid triggering of fuse F1 und F2).
- Relay outputs: Suitable for 2 channel control, for increase in capacity or number of contacts by means of contactors or relays with positive-guided contacts.
- $\mathcal{O}$ = Feedback circuit
- The control recognizes cross-short, cable break and earth leakages in the monitoring circuit.
- Simultaneity monitoring 0.5 seconds

Wiring diagram

The integrated LEDs indicate the following operating states.
- Position relay K1
- Position relay K2

LED

Note

- The wiring diagram is shown with guard doors closed and in de-energized condition.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.
Further products and program extensions

Hygiene-compliant command and signalling devices

The special requirements placed on the hygienic design of food processing machines including those of the standards EN 1672-1 and EN 1672-2 with basic safety and hygienic requirements for machinery of this kind have been transferred to this range of command and signalling devices.

The devices have protection class IP67/IP69K, which makes them suitable for outdoor applications and applications where high hygienic requirements are applicable.

Sub-assemblies for two hand control consoles

In addition to the standard two-hand operating panels, Schmersal can customize panels with additional control devices and illuminated indicator lights. We can also add additional bore holes or special paint finishes/colors to match specific application requirements.

Also available are a wide variety of floor stands, with options for spacer rings, height adjustment, foot-pedal switches, or rollers.
Wherever crushing or shearing points are to be safeguarded, such as on elevating platforms, rising stages, sliding doors or industrial gates, tactile safety devices offer a simple and easy to fit solution. In the hazardous area, two-dimensional safety devices could be useful as well, for instance at industrial robots, punching machines and woodworking machines.

- Safety edges 3-2
- Safety mats 3-12
- Program extensions 3-16
Safety edges

**SE 40**

- Control category optionally 1, 3 or 4 in combination with the SE-100C, SE-304C or SE-400C safety-monitoring module
- Modulated infra-red signal
- Interference-proof against external light
- Regulated transmitter, i.e. automatic adaptation for distance to receiver
- Constant sensitivity independently of the length of the safety edge
- Lengths from 0.4 m to 8 m possible
- Dirt and moisture in the profile are to a great extent compensated
- Transmitter/receiver potted, protection class of the signal transmitter IP67
- Insensitive to environmental conditions
- Max. distance sensors / evaluation 200 m

**SE 70**

- Resistant to chemicals of the rubber material:
  - International abbreviation: EPDM (APTK)
  - Chemical name: ethylene propylene ter polymer
  - Resilience at 20°C: good
  - Resistance against permanent deformation: good
  - General resistance against atmospheric conditions: excellent
  - Resistance against ozone: excellent
  - Resistance against fuels: low
  - Resistance against solvents: low to satisfactory
  - General resistance against acids: good
  - Temperature resistance:
    - Short exposition: −50°C … +170°C
    - Long exposition: −30°C … +140°C

If a higher resistance is required, choose safety edge profiles with 20 µm plastic coating. The coating must be submitted to low mechanical loads only.

**Technical data**

- **Standards**: EN 1760-2
- **Material**:
  - Rubber profile: EPDM, 65 Shore A (optionally with 20 µm plastic coating)
  - Emitter/Receiver: polyurethane
  - Mounting profile: Al-Mg Si OF22
  - Protection class: to EN 60529
  - Emitter/Receiver: IP68
  - Signal transmitter, complete: IP67
- **Mode of operation**: Optoelectronic
- **Possible length**: 40 cm ... 8 m
- **Operating range of the homologated signal transmitter**: +5 °C ... +55 °C
- **Max. permanent load**: on the operational switching zone 500 N
- **Operating speed**:
  - Signal transmitters: max. 100 mm/s, (Exception: SE-P40 with SE-400C: max. 40 mm/s)
- **Response travel**: max. 9 mm
- **After-travel**:
  - Receiver: P 40: max. 18 mm
  - Emitter: P 70: max. 45 mm
- **Connection**:
  - Transmitter/Receiver: cable 3 x 0.14 mm² flexible
- **Cable length**:
  - Receiver: 3 m or 20 m
  - Emitter: 6.5 m or 10.5 m
- **Mechanical life**: 20 million operations

* Certification in combination with safety monitoring modules SE-100C, SE-304C or SE-400C. Coated and NBR profiles are not included in this approval.

**Approvals**

**Ordering details**

<table>
<thead>
<tr>
<th>Rubber profile SE-P</th>
<th>Replace</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Uncoated profile</td>
<td>C</td>
<td>Coated profile</td>
</tr>
<tr>
<td>2 40</td>
<td>40NBR</td>
<td>40 mm high EPDM</td>
</tr>
<tr>
<td>3 70</td>
<td>XXXX</td>
<td>70 mm high NBR</td>
</tr>
<tr>
<td>3 1250</td>
<td></td>
<td>Profile length in mm</td>
</tr>
<tr>
<td>2500</td>
<td>1,250 mm</td>
<td></td>
</tr>
<tr>
<td>5000</td>
<td>2,500 mm</td>
<td></td>
</tr>
<tr>
<td>10000</td>
<td>5,000 mm</td>
<td></td>
</tr>
<tr>
<td>10,000</td>
<td>10,000 mm</td>
<td></td>
</tr>
</tbody>
</table>

**Note**

A safety edge system consists of individual components. The components must be ordered separately.

*(Example)*

- Rubber profile, SE-P40-1250
- Al profile, SE-AL 10-1250
- Emitter/Receiver SE-SET
- Safety-monitoring module, SE-304 C
- Options: Caps, SE-T40; Sticker, SE-G8406
- Other accessories

**Note**

In the extremities of the safety edge at approx. 60 mm (SE 40) or 50 mm (SE 70) finger guard is not guaranteed. Upon actuation of this area, the transmitter/receiver is pushed into the lower profile section and the switching signal is evaluated, but the required forces are high though. If this restriction is not acceptable for the specific application, constructive measures must be taken.
## Safety edges

### System components

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>For rubber profile SE-40</td>
</tr>
<tr>
<td>2</td>
<td>For rubber profile SE-70</td>
</tr>
<tr>
<td>0</td>
<td>Without mounting flange</td>
</tr>
<tr>
<td>2</td>
<td>With mounting flange</td>
</tr>
<tr>
<td>3</td>
<td>1,250 mm Larger lengths possible by connecting multiple Aluminum profiles</td>
</tr>
</tbody>
</table>

### Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>1250</td>
</tr>
</tbody>
</table>

### Monitoring of safety edges using

<table>
<thead>
<tr>
<th>Part</th>
<th>Number of safety edges</th>
<th>Max. control category</th>
<th>Refer to page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE-100C</td>
<td>2</td>
<td>1</td>
<td>3-6</td>
</tr>
<tr>
<td>SE-304C</td>
<td>4</td>
<td>3</td>
<td>3-8</td>
</tr>
<tr>
<td>SE-400C</td>
<td>1</td>
<td>4</td>
<td>3-10</td>
</tr>
</tbody>
</table>

### Sensor-sets

<table>
<thead>
<tr>
<th>Part</th>
<th>Transmitter cable</th>
<th>Receiver cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE-SET</td>
<td>6.5 m</td>
<td>3 m</td>
</tr>
<tr>
<td>SE-SET 3M/10.5M</td>
<td>10.5 m</td>
<td>3 m</td>
</tr>
<tr>
<td>SE-SET 10.5M/20M</td>
<td>10.5 m</td>
<td>20 m</td>
</tr>
</tbody>
</table>
Safety edges

System components

| Wiring tool SE-WA |

Mounting

| Notice |
- Saw off Aluminum rails and fit.
- Cut the rubber profile to length
- Clip the rubber profile into the Aluminum rail
- Press the transmitter and receiver units into the ends of the profile

Ordering details

| Wiring tool, 6 m SE-WA |
- Spiral cable, 1 m extendable to 3 m SE-CC 1301
- 4 x 0.25 mm² SE-CC 1302
- 5 x 0.5 mm²
Safety edges

Force-travel diagram

<table>
<thead>
<tr>
<th>Speed [mm/s]</th>
<th>Curve section</th>
<th>Deformation travel [mm]</th>
<th>Force [N]</th>
<th>Connected module</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to A 100</td>
<td>a₁, a₂</td>
<td>9, 9.7</td>
<td>92</td>
<td>SE-100C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>88</td>
<td>SE-304C</td>
</tr>
<tr>
<td></td>
<td>b</td>
<td>24</td>
<td>250</td>
<td>SE-100C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-304C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-400C</td>
</tr>
<tr>
<td>up to A 10</td>
<td>c</td>
<td>27</td>
<td>400</td>
<td>SE-100C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-304C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-400C</td>
</tr>
<tr>
<td></td>
<td>d</td>
<td>29</td>
<td>600</td>
<td>SE-100C</td>
</tr>
<tr>
<td></td>
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<td>SE-304C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-400C</td>
</tr>
</tbody>
</table>

Legend

A actuating point, switching point of the module
a actuating travel
b, c, d overall deformation travel until the indicated force is achieved

Run-on travel = a₁,₂ – b / c / d

Applicable test conditions
Parameters of the measurement:
Temperature: T = 23 °C
Mounting position: B (nach EN 1760-2)
Place of measurement: C 3 (nach EN 1760-2)

The run-on travel is affected by the response time of the connected module.

Force-travel diagram

SE-P70

<table>
<thead>
<tr>
<th>Speed [mm/s]</th>
<th>Curve section</th>
<th>Deformation travel [mm]</th>
<th>Force [N]</th>
<th>Connected module</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to A 100</td>
<td>a₁, a₂</td>
<td>8, 9.1</td>
<td>22</td>
<td>SE-100C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>23</td>
<td>SE-304C</td>
</tr>
<tr>
<td></td>
<td>b</td>
<td>51</td>
<td>250</td>
<td>SE-100C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-304C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-400C</td>
</tr>
<tr>
<td>up to A 10</td>
<td>c</td>
<td>53</td>
<td>400</td>
<td>SE-100C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-304C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-400C</td>
</tr>
<tr>
<td></td>
<td>d</td>
<td>54</td>
<td>600</td>
<td>SE-100C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-304C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-400C</td>
</tr>
</tbody>
</table>

Legend

A actuating point, switching point of the module
a actuating travel
b, c, d overall deformation travel until the indicated force is achieved

Run-on travel = a₁,₂ – b / c / d

Applicable test conditions
Parameters of the measurement:
Temperature: T = 23 °C
Mounting position: B (nach EN 1760-2)
Place of measurement: C 3 (nach EN 1760-2)

The run-on travel is affected by the response time of the connected module.
Safety edges

SE-100C

- To monitor 1 or 2 safety edges
- 1 safety contact, STOP 0
- 1 signalling output (changeover contact)
- Operating voltage 24 VDC
- LED display

Technical data

Standards: EN 1760-2, IEC 60947-5-3, IEC 61508
Start conditions: automatic
Feedback circuit (Y/N): no
Response time: 16 ms
Time to readiness: max. 300 ms
Opening duration: max. 300 ms
Closing duration: typ. 15 ms
Rated operating voltage $U_e$: 24 VDC (+ 20 % / -10%)
Rated operating current $I_e$: ca. 150 mA
Internal electronic protection (Y/N): yes
Power consumption: < 4 W

Monitored inputs:
- Short-circuit recognition: yes
- Wire breakage detection: yes
- Earth connection detection: yes

Outputs:
Stop category 0: 1
Stop category 1: 0
Number of safety contacts: 1
Number of auxiliary contacts: 1
Number of signalling outputs: 1
Max. switching capacity of the safety contacts: 2 A / 230 VAC
2 A / 24 VDC
Utilization category to EN 60947-5-1:
AC-15: 230 V / 2 A
DC-13: 24 V / 2 A
Mechanical life: 20 million operations
LED display: supply voltage, safety edge function

Ambient conditions:
Environmental temperature: +5 °C ... +55 °C
Protection class: Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting: Snaps onto standard DIN rail to EN 60715
Connection type: Screw connection
- max. cable section: max. 2 x 1.5 mm² (incl. conductor ferrules)
Weight: 164 g
Dimensions (Height/Width/Depth): 100 x 22.5 x 120 mm

Approvals

Ordering details

SE-100C

Classification

Safety parameters:
Standards: EN ISO 13849-1; IEC 61508; IEC 60947-5-3
PL: up to c
Category: up to 1
PFH value: $1.73 \times 10^{-6}$ h for max. 36,500 switching cycles/year and max. 60% contact load
SIL: up to 1
Mission time: 20 years

For more information, see our online product catalog: www.usa.schmersal.net
Safety edges

Note

• Monitoring the safety edges SE 40 / SE 70 with a safety monitoring unit SE-100C for PL c and category 1.
• If only one safety edges SE 40 / SE 70 is connected, the terminals S12-S22 must be bridged.
• The manual reset function, if required, must be realized in the machine control. Both re-initialization and auto-reset must comply with the requirements of EN 1760-2 (diagram A2, A3).

Wiring diagram

Note

• The wiring diagram is shown for the de-energized condition.
• The overall machine safety depends on the professional mounting and installation of the safety monitoring module and the signal transmitter, as well as on the correct and professional electrical connection of the components.
• If there is any risk whatsoever, the machine may not be restarted.
• Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.
### Technical data

<table>
<thead>
<tr>
<th>Standards:</th>
<th>EN 1760-2, IEC 60947-5-3, IEC 61508</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start conditions:</td>
<td>automatic or start button</td>
</tr>
<tr>
<td>Feedback circuit (Y/N):</td>
<td>yes</td>
</tr>
<tr>
<td>Response time:</td>
<td>&lt; 17 ms</td>
</tr>
<tr>
<td>ON delay with reset button:</td>
<td>100 ms up to 2 s</td>
</tr>
<tr>
<td>Rated operating voltage $U_e$:</td>
<td>24 VDC (+20% / -10%)</td>
</tr>
<tr>
<td></td>
<td>24 VAC (+10% / -10%)</td>
</tr>
<tr>
<td>Rated operating current $I_e$:</td>
<td>ca. 500 mA (for 4 safety edges)</td>
</tr>
<tr>
<td>Frequency range:</td>
<td>50 Hz</td>
</tr>
<tr>
<td>Internal electronic protection (Y/N):</td>
<td>yes</td>
</tr>
<tr>
<td>Power consumption:</td>
<td>&lt; 4 W</td>
</tr>
</tbody>
</table>

### Monitored inputs:

- Short-circuit recognition: yes
- Wire breakage detection: yes
- Earth connection detection: yes

### Outputs:

- Stop category 0: 1
- Stop category 1: 0
- Number of safety contacts: 1
- Number of auxiliary contacts: 0
- Number of signalling outputs: 1
- Max. switching capacity of the safety contacts: 2 A / 230 VAC, 2 A / 24 VDC
- Utilization category to EN 60947-5-1: AC-15: 230 V / 2 A, DC-13: 24 V / 2 A
- Mechanical life: > 10 million operations
- LED display: supply voltage, safety edge function

### Ambient conditions:

- Environmental temperature: +5 °C ... +55 °C
- Protection class: Enclosure: IP40, Terminals: IP20, Clearance: IP54
- Mounting: Snaps onto standard DIN rail to EN 60715
- Connection type: Screw connection
- Max. cable section: max. 2 x 1.5 mm² (incl. conductor ferrules)
- Weight: 175 g
- Dimensions (Height/Width/Depth): 100 x 22.5 x 121 mm

### Approvals

![CE Mark]

### Ordering details

**SE-304C**

- To monitor 1 to 4 safety edges
- 1 safety contact, STOP 0
- 1 semi-conductor signalling output
- Operating voltage 24 VAC/DC
- LED display
- Start-function with trailing edge (optional)

### Classification

### Safety parameters:

<table>
<thead>
<tr>
<th>Standards:</th>
<th>EN ISO 13849-1; IEC 61508; IEC 60947-5-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL:</td>
<td>up to d</td>
</tr>
<tr>
<td>Category:</td>
<td>up to 3</td>
</tr>
<tr>
<td>PFH value:</td>
<td>$1.0 \times 10^{-7}$/h for max. 36,500 switching cycles/year and max. 80% contact load</td>
</tr>
<tr>
<td>SIL:</td>
<td>up to 2</td>
</tr>
<tr>
<td>Mission time:</td>
<td>20 years</td>
</tr>
</tbody>
</table>
Safety edges

Note

• Monitoring 1 – 4 safety edges SE 40 / SE 70 using safety monitoring module SE-304C for PL d and category 3.
• Manual reset function or auto-reset:
  The manual reset function is triggered by an edge-sensitive signal (edge switching “0-1-0” within 100 ms up to 2 s) (X2/X3). Alternatively, the auto-reset function can be activated by a connection (A3/X2). Both re-initialization and auto-reset must comply with the requirements of EN 1760-2 (diagram A2, A3).
• If less than 4 safety edges are connected, the following diagram must be observed.

Wiring diagram

Note

• The wiring diagram is shown for the de-energized condition.
• The overall machine safety depends on the professional mounting and installation of the safety monitoring module and the signal transmitter, as well as on the correct and professional electrical connection of the components.
• If there is any risk whatsoever, the machine may not be restarted.
• Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.
### Safety edges

**SE-400C**

- To monitor 1 safety edge
- 2 safety contacts, STOP 0
- 1 semi-conductor signalling output
- Operating voltage 24 VDC
- LED display
- Start function

### Technical data

<table>
<thead>
<tr>
<th>Standards:</th>
<th>EN 1760-2, IEC 60947-5-3, IEC 61508</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start conditions:</td>
<td>automatic or start button</td>
</tr>
<tr>
<td>Feedback circuit (Y/N):</td>
<td>yes</td>
</tr>
<tr>
<td>Response time:</td>
<td>32 ms</td>
</tr>
<tr>
<td>Time to readiness:</td>
<td>ca. 32 ms</td>
</tr>
<tr>
<td>Opening duration:</td>
<td>ca. 32 ms</td>
</tr>
<tr>
<td>Closing duration:</td>
<td>typ. 15 ms</td>
</tr>
<tr>
<td>Rated operating voltage $U_e$:</td>
<td>24 VDC (+ 20% / -10%)</td>
</tr>
<tr>
<td>Rated operating current $I_e$:</td>
<td>ca. 150 mA</td>
</tr>
<tr>
<td>Internal electronic protection (Y/N):</td>
<td>yes</td>
</tr>
<tr>
<td>Power consumption:</td>
<td>&lt; 4 W</td>
</tr>
</tbody>
</table>

### Monitored inputs:

- Short-circuit recognition: yes
- Wire breakage detection: yes
- Earth connection detection: yes

### Outputs:

- Stop category 0: 2
- Stop category 1: 0
- Number of safety contacts: 2
- Number of auxiliary contacts: 0
- Number of signalling outputs: 1
- Max. switching capacity of the safety contacts: 2 A / 230 VAC
- Utilization category to EN 60947-5-1: AC-15: 230 V / 2 A
- DC-13: 24 V / 3 A
- Mechanical life: 30 million operations
- LED display: supply voltage, safety edge function

### Ambient conditions:

- Environmental temperature: +5 °C … +55 °C
- Protection class: Enclosure: IP40, Terminals: IP20, Clearance: IP54
- Mounting: Snaps onto standard DIN rail to EN 60715
- Connection type: Screw connection
- max. cable section: max. 2 x 1.5 mm² (incl. conductor ferrules)
- Weight: 184 g
- Dimensions (Height/Width/Depth): 100 x 22.5 x 120 mm

### Approvals

![Approvals Icon]

### Ordering details

**SE-400C**

### Classification

**Safety parameters:**

<table>
<thead>
<tr>
<th>Standards:</th>
<th>EN ISO 13849-1; IEC 61508; IEC 60947-5-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL:</td>
<td>up to e</td>
</tr>
<tr>
<td>Category:</td>
<td>up to 4</td>
</tr>
<tr>
<td>PFH value:</td>
<td>$5.0 \times 10^{-9}$ /h for max. 36,500 switching cycles/year and max. 60% contact load</td>
</tr>
<tr>
<td>SIL:</td>
<td>up to 3</td>
</tr>
<tr>
<td>Mission time:</td>
<td>20 years</td>
</tr>
</tbody>
</table>

---

For more information, see our online product catalog: [www.usa.schmersal.net](http://www.usa.schmersal.net)
Safety edges

Note

• Monitoring the safety edges SE 40 / SE 70 with a safety monitoring unit SE-400C for PL e and category 4.
• The feedback circuit monitors positions of the contactors KA and KB.
• A Start-Reset- push button can optionally be connected to the feedback circuit. Both re-initialization and auto-reset must comply with the requirements of EN 1760-2 (diagram A2, A3).

Wiring diagram

• The wiring diagram is shown for the de-energized condition.
• The overall machine safety depends on the professional mounting and installation of the safety monitoring module and the signal transmitter, as well as on the correct and professional electrical connection of the components.
• If there is any risk whatsoever, the machine may not be restarted.
• Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.
Safety mat

SMS 4

- Certified to EN 1760-1
- Response time max. 25 ms
- Robust design
- High resistance to chemicals
- Slip-free surface
- Cascading possible
- Special sizes and shapes available on request
- No additional terminating resistor required
- Aluminum frame and corner sections available

Legend:
A: active surface

• 250-500 250 x 500 mm
• 500-500 500 x 500 mm
• 500-1000 500 x 1000 mm
• 750-1000 750 x 1000 mm
• 1000-1000 1000 x 1000 mm
• 1000-1500 1000 x 1500 mm

SMS 5

- Certified to EN 1760-1
- Response time max. 25 ms
- Robust design
- High resistance to chemicals
- Slip-free surface
- Cascading possible
- Special sizes and shapes available on request
- No additional terminating resistor required
- With molded ramp profile

Legend: A: active surface

Total size = A + 2 x 35 mm

Technical data

Standards: EN 1760-1
Control category: up to 3 to EN 954-1
Surface material: polyurethane, black
Protection class: IP65 to EN 60529
Ambient temperature: 0°C … +60°C
Fitting height: 14 mm
Weight: 17 Kg / m²
Actuating force: 150N with round body Ø 80mm
Cable:
- SMS 4: 4 x 0.34 mm²
- SMS 5: 2 pc. 2 x 0.34 mm²
Cable length: 6 m
Response time: ≤ 25 ms
Mechanical life: > 1.5 million operations
Admissible load: 2000 N / 80 mm Ø
Inactive edge: ≤ 10mm

Classification: (In combination with safety monitoring module SRB 301 HC)
Standards: EN ISO 13849-1; IEC 61508; IEC 60947-5-3
PL: up to d
Category: up to 3
PFH value: 1.0 x 10⁻⁷ /h for max. 52,500 switching cycles/year and max. 60% contact load
SIL: up to 2 in combination with safety monitoring module
Mission time: 20 years

Chemical resistance:
- Water: Resistant
- 10% acids: Resistant
- 10% caustic solutions: Resistant
- Oils: Resistant
- Gasoline: Resistant
- Other on request

Approvals

Ordering details

<table>
<thead>
<tr>
<th>SMS 4</th>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>250-500</td>
<td>Active surface</td>
<td>250 x 500 mm</td>
</tr>
<tr>
<td></td>
<td>500-500</td>
<td>500 x 500 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>500-1000</td>
<td>500 x 1000 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>750-1000</td>
<td>750 x 1000 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1000-1000</td>
<td>1000 x 1000 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1000-1500</td>
<td>1000 x 1500 mm</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SMS 5</th>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>250-500</td>
<td>Active surface</td>
<td>250 x 500 mm</td>
</tr>
<tr>
<td></td>
<td>500-500</td>
<td>500 x 500 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>500-1000</td>
<td>500 x 1000 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>750-1000</td>
<td>750 x 1000 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1000-1000</td>
<td>1000 x 1000 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1000-1500</td>
<td>1000 x 1500 mm</td>
<td></td>
</tr>
</tbody>
</table>

Note

Safety Distance Calculations:
S = 1600 mm/s x (T) + 1200 mm
Legend:
T = Total response time from triggering to machine stop, in seconds.
### SMS 4 safety mats accessories

#### System components

<table>
<thead>
<tr>
<th>Component</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ramp rail SMS 4-RS-3000</td>
<td><img src="image" alt="Ramp rail SMS 4-RS-3000" /></td>
</tr>
<tr>
<td>SMS 4-BS-3000 fixing rail</td>
<td><img src="image" alt="SMS 4-BS-3000 fixing rail" /></td>
</tr>
<tr>
<td>Corner section SMS 4-EV</td>
<td><img src="image" alt="Corner section SMS 4-EV" /></td>
</tr>
</tbody>
</table>

#### System components

<table>
<thead>
<tr>
<th>Component</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixing rail 3000 mm long</td>
<td><img src="image" alt="Fixing rail 3000 mm long" /></td>
</tr>
<tr>
<td>Corner section (1 pc) SMS 4-EV</td>
<td><img src="image" alt="Corner section (1 pc) SMS 4-EV" /></td>
</tr>
</tbody>
</table>

### Ordering details

<table>
<thead>
<tr>
<th>Component</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ramp rail</td>
<td>SMS 4-RS 3000 3000 mm long</td>
</tr>
<tr>
<td>Fixing rail</td>
<td>SMS 4-BS-3000 3000 mm long</td>
</tr>
<tr>
<td>Corner section</td>
<td>SMS 4-EV</td>
</tr>
</tbody>
</table>

Precut trim kits
- includes 4 rails, 4 corners sections

For mat size:
- 250 x 500 mm: SMS4-RS 250-500
- 500 x 500 mm: SMS4-RS 500-500
- 500 x 1000 mm: SMS4-RS 500-1000
- 750 x 1000 mm: SMS4-RS 750-1000
- 1000 x 1000 mm: SMS4-RS 1000-1000
- 1000 x 1500 mm: SMS4-RS 1000-1500

For more information, see our online product catalog: [www.usa.schmersal.net](http://www.usa.schmersal.net)
Safety mat

SRB 301HC

- Safety-monitoring module for safety mats
- 3 enabling contacts
- 1 signalling contact
- Cross-wire detection
- Feedback circuit to monitor external contactors
- Monitored start or automatic start
- LED status indication
- Plug-in terminals

Technical data

Standards:
IEC/EN 60204-1, IEC/EN 60947-5-1, EN ISO 13849-1; IEC 61508

Start conditions: automatic or start button (optionally monitored)

With feedback circuit (Y/N): yes
ON delay with reset button: ≤ 50 ms
Drop-out delay on „emergency stop“: ≤ 20 ms
Drop-out delay on „supply failure“: ≤ 100 ms

Rated operating voltage U_e: 48 ... 240 VAC; 24 VAC/DC
Frequency range: 50 / 60 Hz

Fuse rating for the operating voltage:
230 VAC version: primary side: smelting fuse, tripping current > 1.0 A;
secondary side: internal electronic fuse, tripping current > 0.12 A;
24 VAC/DC version: primary side: 230 VAC version: no
secondary side: internal electronic fuse, tripping current > 0.5 A

Current consumption:
230 VAC version: 1.6 W; 4.2 VA
24 VAC/DC version: 1.4 W; 3.3 VA

Inputs monitoring:
-Cross-wire detection: yes
-Wire breakage detection: yes
-Earth leakage detection: yes
Number of NC contacts: 2
Number of NO contacts: 0
Max. total line resistance: 40 W

Outputs:
Stop category 0:
3
Stop category 1:
0
Number of safety contacts: 3
Number of signaling outputs:
1
Max. switching capacity of the safety contacts: 250 VAC, 8 A resistive (inductive with suitable protective circuit)

Utilization category to EN 60947-5-1:
AC-16: 230 V / 6 A;
DC-13: 24 V / 6 A

Mechanical life: 107 operations

Ambient conditions:
Operating ambient temperature: –25°C ... +60°C
Storage and transport temperature: –25°C ... +85°C
Protection class:
enclosure: IP40, terminals: IP20, terminal space: IP54
Mounting:
snaps onto standard DIN rails to DIN EN 60715

Connection type:
plug-in type screw terminals
- min. cable section: 0.25 mm²
- max. cable section: 2.5 mm²

Weight:
230 VAC version: 340 g;
24 VAC/DC version: 320 g

Dimensions (height/width/depth):
100 x 45 x 121 mm

Classification

Safety parameters:
Standards: EN ISO 13849-1, IEC 61508, EN 60947-5-1

PL:
STOP 0: up to e

Category:
STOP 0: up to 4

PFH value:
STOP 0: ≤ 2.00 x 10⁻⁸/h

SIL:
STOP 0: up to 3

Mission time:
20 years

The PFH value of 2.00 x 10⁻⁸/h applies to the combinations of contact load (current through enabling contacts) and number of switching cycles (n-op/y) mentioned in the table below.

<table>
<thead>
<tr>
<th>Contact load</th>
<th>n-op/y</th>
<th>t-cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 %</td>
<td>525,600</td>
<td>1.0 min</td>
</tr>
<tr>
<td>40 %</td>
<td>210,240</td>
<td>2.5 min</td>
</tr>
<tr>
<td>60 %</td>
<td>75,087</td>
<td>7.0 min</td>
</tr>
<tr>
<td>80 %</td>
<td>30,918</td>
<td>17.0 min</td>
</tr>
<tr>
<td>100 %</td>
<td>12,223</td>
<td>43.0 min</td>
</tr>
</tbody>
</table>

The above-mentioned switching cycle times (t-cycle) for the relay contacts.
Diverging applications upon request.
Safety mat

Note

- Protection of a safety mat
- Start button with edge detection
- Feedback circuit to monitor the external contactors
- Series-wiring of multiple safety mats possible
- Reset button

Wiring example

The integrated LEDs indicate the following operating states.
- Position relay K1
- Position relay K2
- Supply voltage $U_B$

Note

- The wiring example is shown with the safety mat in non-actuated and de-energized condition.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.
Further products and program extensions

SSG-SBL safety bumper

Safety bumpers are often used to monitor automated-guided vehicles or at rotating machine components where long run-ons, up to approximately 400 mm, can be expected.

Contrary to the conventional safety devices of this kind, the BIA-approved SSG-SBL has a dual-channel design. Several modules are available for signal monitoring.

STW-SL safety edges

Safety edges are used for the protection of shearing and crushing points.

Depending on the application, different rubber profiles and rails are available.

Special advantage: Depending on the system, geometrically more complicated and customer-specific models without dead corners can be produced.
Safe switching and monitoring
Optoelectronic safety devices

Schmersal offers a comprehensive range of active optoelectronic devices (AOPD) to provide non-separating safeguarding of hazardous areas, ranging from point of operation to danger zone or perimeter guarding. These “virtual safety guards” are available as safety light barriers, safety light grids and safety light curtains. They are available with different functions such as blanking, muting, cascading, or cyclic operation. IP69K versions are also available. A large assortment of accessories such as deflecting mirrors and mounting brackets helps the user in installing and using AOPD in his specific application.

Our safety light curtains and grids feature one-piece extruded aluminum housings, in rectangular and circular profiles. This closed housing profile has proven to be less susceptible to mechanical damage, misalignment from torsion or bending, and relieves the stress normally put on the lens in other light curtains.

Further detailed information on this product group can be found in the Optoelectronics catalog.

Safety light curtains and light grids
- SLC 440COM
- SLC 440
- SLC 445
- SLC 425I
- SLC 420
- SLC 220
- Accessories

Safety light barriers
- SLB 240
- SLB 440

Safety distance calculations
see appendix

A-10
## Safety light curtains and safety light grids

### SLC 440COM

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>xxxxx</td>
<td>Protected heights (mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0330, 0410, 0490, 0570, 0650, 0730, 0810, 0890,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0970, 1050, 1130, 1210, 1290, 1370, 1450, 1530*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1610*, 1690*, 1770*, 1850**, 1930***</td>
</tr>
</tbody>
</table>

### SLG 440COM

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Distance between outermost beams:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0500-02</td>
<td>500 mm, 2-beam</td>
</tr>
<tr>
<td></td>
<td>0800-03</td>
<td>800 mm, 3-beam</td>
</tr>
<tr>
<td></td>
<td>0900-04</td>
<td>900 mm, 4-beam</td>
</tr>
<tr>
<td></td>
<td>Range 0.3 ... 12 m</td>
<td></td>
</tr>
</tbody>
</table>

### Technical data

- **Standards:** EN 61496-1; CLC/TS 61496-2
- **Category:** Type 4
- **Enclosure:** aluminum
- **Enclosure dimensions:** 27.8 x 33 mm
- **Connection:** Connector plug
  - Emitter: M12, 4-pole,
  - Receiver: M12, 4-pole or 5-pole
- **Max. cable length:** 100 m / 1 Ω
- **Protection class:** IP67 to EN 60529
- **Response time:** 10 ... 28 ms (depends on length and resolution)
- **Detection sensitivity (Resolution):**
  - 14 mm: range is 0.3 to 6 m
  - 35 mm: range is 0.3 to 6 m
- **Protection field height:**
  - Light curtains: 330 ... 1770 mm
  - 2-, 3-, 4-beam light grids: 500, 800, 900 mm
- **Protection field width, Range:**
  - Resolution 14, 35 mm: 0.3 m ... 7 m
  - Resolution 30 mm: 0.3 m ... 10 m
  - 2-, 3-, 4-beam: 0.3 m ... 12 m
- **Start/restart interlock:** Integrated
- **Light emission wavelength:** 880 nm (infrared)
- **Ue:** 24 VDC ± 10%
- **Safety outputs:** 2 x PNP, 250 mA
- **Status and diagnostics:** LED endcap,
- **Ambient temperature:** -10 °C ... +50 °C
- **Storage and transport temperature:** -25 °C ... +70 °C
- **Classification:**
  - **Standards:** EN ISO 13849-1; EN 62061
  - **PL:** up to e
  - **Category:** up to 4
  - **PFH-value:** 8.05 x 10^-9/h
  - **SIL:** up to 3
  - **Service life:** 20 years

### Ordering details

#### SLC 440COM-E/R-01-01

- **Connector:** Female connector M12
- **for emitter & receiver (automatic restart)**
  - 4-pole cable, length 5 m
  - 4-pole cable, length 10 m
  - 4-pole cable, length 20 m
  - 5-pole cable, length 5 m
  - 5-pole cable, length 15 m

#### SLG 440COM-E/R-01-01

- **Mounting brackets included in delivery**
- **Legend:**
  - A = Total length
  - 2-beam A = 571 mm
  - 3-beam A = 871 mm
  - 4-beam A = 971 mm

### Approvals

#### TUV

- **CE**
- **UL**
- **VDE**
Safety light curtains and safety light grids

**SLC 440**
- Safety light curtain
  - Type 4 to EN 61496-1, CLC/TS 61496-2
  - Resolution 14 and 30 mm
  - Protection field heights 170 mm ... 1930 mm
  - Integrated start/restart interlock
  - Integrated contactor control
  - Integrated double acknowledgment/reset
  - Integrated blanking function (fixed and mobile blanking)
  - Diagnostic and parametrization interface
  - Range 0.3 m ... 10 m
  - Fail-safe transistor outputs
  - Beam coding
  - Illuminated LED end cap status indicator
  - 7-segment display, rotatable 180°
  - Protection class IP67

**SLG 440**
- Safety light grid
  - 2-, 3- or 4-beam light grid
  - Range 0.3 ... 12 m, high range up to 20 m

Legend:
- A = Total length
- 2-beam A = 610 mm
- 3-beam A = 910 mm
- 4-beam A = 1010 mm

**Technical data**
- Standards: EN 61496-1; CLC/TS 61496-2
- Category: Type 4
- Connection: Connector plug
  - Emitter: M12, 4-pole
  - Receiver: M12, 8-pole
- Max. cable length: 100 m / 1 Ω
- Protection class: IP67 to EN 60529
- Response time: 10 ... 40 ms (depends on length and resolution)

Detection sensitivity (Resolution):
- Resolution 14 mm: 14 and 30 mm
- Resolution 30 mm: 170 ... 1930 mm
- 2-, 3-, 4-beam: 500, 800, 900 mm

**SLG 440-E/R (1-2-01)**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>xxxx</td>
<td>Protected heights (mm): 0170, 0250, 0330, 0410, 0490, 0570, 0650, 0730, 0810, 0890, 0970, 1050, 1130, 1210, 1290, 1370, 1450, 1530, 1610, 1690, 1770, 1850, 1930</td>
</tr>
<tr>
<td>2</td>
<td>14</td>
<td>Resolution 14 mm with a range of 0.3 m ... 7 m</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>Resolution 30 mm with a range of 0.3 m ... 10 m</td>
</tr>
</tbody>
</table>

Mounting brackets included in delivery

**Approvals**

**Ordering details**

**SLC 440-E/R (1-2-01)**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0500-02</td>
<td>500 mm, 2-beam</td>
</tr>
<tr>
<td></td>
<td>0800-03</td>
<td>800 mm, 3-beam</td>
</tr>
<tr>
<td></td>
<td>0900-04</td>
<td>900 mm, 4-beam</td>
</tr>
<tr>
<td>2</td>
<td>-01</td>
<td>Range 0.3 ... 12 m</td>
</tr>
<tr>
<td></td>
<td>-H1</td>
<td>Range 3 ... 20 m</td>
</tr>
</tbody>
</table>

**Ordering details**

**SLG 440-E/R (1-2)**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Distance between outermost beams: 0500-02 500 mm, 2-beam 0800-03 800 mm, 3-beam 0900-04 900 mm, 4-beam</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>-01</td>
<td>Range 0.3 ... 12 m</td>
</tr>
<tr>
<td></td>
<td>-H1</td>
<td>Range 3 ... 20 m</td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: www.usa.schmersal.net
### Safety light curtains and safety light grids

#### SLC 445

<table>
<thead>
<tr>
<th>No.</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>xxxx</td>
<td>Protected heights (mm) 0170, 0250, 0330, 0410, 0490, 0570, 0650, 0730, 0810, 0890, 0970, 1050, 1130, 1210, 1290, 1370, 1450, 1530*, 1610*, 1690*, 1770*</td>
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<tr>
<td>2</td>
<td>14</td>
<td>Resolution 14 mm with a range of 0.3 m ... 7 m</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>Resolution 30 mm with a range of 0.3 m ... 10 m</td>
</tr>
</tbody>
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#### SLG 445

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A = Total length</td>
<td>2-beam A = 611 mm Receiver 621 mm 3-beam A = 911 mm Receiver 921 mm 4-beam A = 1011 mm Receiver 1021 mm</td>
</tr>
</tbody>
</table>

#### Technical data

- **Standards:** EN 61496-1; CLC/TS 61496-2
- **Category:** Type 4
- **Enclosure:** Aluminum
- **Enclosure dimensions:** 27.8 x 33 mm
- **Connection:** Connector plug
  - Emitter: M12, 4-pole,
  - Receiver: M12, 8- or 12-pole
- **Max. cable length:** 100 m / 1 Ω
- **Protection class:** IP67 to EN 60529
- **Response time:** 10 ... 27 ms (depends on length and resolution)
- **Detection sensitivity (Resolution):**
  - Resolution 14 mm 170 ... 1450 mm
  - Resolution 30 mm 170 ... 1770 mm
- **Protection field height, Range:**
  - Resolution 14 mm 0.3 m ... 7 m
  - Resolution 30 mm 0.3 m ... 10 m
  - 2-, 3-, 4-beam 0.3 m ... 20 m
- **Start/restart interlock:** Integrated
- **Contactor control:** Integrated
- **Blanking function:** Integrated
- **Light emission wavelength:** 880 nm (infrared)
- **Ue:** 24 VDC ± 10%
- **Safety outputs:** 2 x PNP, 250 mA
- **Status and diagnostics:** 7-segment display
- **Ambient temperature:** -25 °C ... +50 °C
- **Storage and transport temperature:** -25 °C ... +70 °C
- **Classification:**
  - Standards: EN ISO 13849-1; EN 62061
  - PL: up to e
  - Category: up to 4
  - PFH-value: 5.14 x 10^-9 /h
  - SIL: up to 3
  - Service life: 20 years

#### Approvals

- **TUV**
- **CE**

#### Ordering details

**SLC 445-E/R ➀-①-01**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
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<tbody>
<tr>
<td>②</td>
<td>14</td>
<td>Resolution 14 mm with a range of 0.3 m ... 7 m</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>Resolution 30 mm with a range of 0.3 m ... 10 m</td>
</tr>
</tbody>
</table>

* only for resolution 30 mm

**SLG 445-E/R ➀-②**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Distance between outermost beams: 0500-02 500 mm, 2-beam 0800-03 800 mm, 3-beam 0900-04 900 mm, 4-beam</td>
<td></td>
</tr>
<tr>
<td></td>
<td>②</td>
<td>Range 0.3 ... 12 m</td>
</tr>
<tr>
<td></td>
<td>-H1</td>
<td>Range 3 ... 20 m</td>
</tr>
</tbody>
</table>

Mounting brackets included in delivery

For more information, see our online product catalog: [www.usa.schmersal.net](http://www.usa.schmersal.net)

For more information, see our online product catalog: [www.usa.schmersal.net](http://www.usa.schmersal.net)
Safety light curtains and safety light grids

### SLC 425I

- **Safety light curtain**
- Type 4 to IEC/EN 61496-1, -2
- Resolution 14 and 30 mm
- Protection field heights 170 mm ... 1770 mm
- Integrated start/restart interlock
- Integrated contactor control
- Integrated muting and override function
- Cyclic operation (1 ... 8 Cycles)
- Fail-safe transistor outputs
- Optical synchronisation
- Status display
- Different muting sequences can be parameterized
- Protection class IP67

**Legend:**
- **A** = Total length

**Emitter:**
- A = 84.5 mm + Protection field height

**Receiver:**
- A = 148.5 mm + Protection field height

**Approvals**

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>xxxx</td>
<td>Protected heights (mm) 0170, 0250, 0330, 0410, 0490, 0570, 0650, 0730, 0810, 0890, 0970, 1050, 1130, 1210, 1290, 1370, 1450, 1530*, 1610*, 1690*, 1770*</td>
</tr>
<tr>
<td>2</td>
<td>14, 30</td>
<td>Resolution 14 mm, 30 mm</td>
</tr>
</tbody>
</table>

### SLG 425I

- **Safety light grid**
- 2-, 3-, 4-beam light grid
- Protection field heights 500, 800 or 900 mm
- Range 0.3 ... 18 m

**Legend:**
- **A** = Total length

**Emitter:**
- A = 804 mm
- 3 and 4-beam A = 1124 mm

**Receiver:**
- A = 868 mm
- 3 and 4-beam A = 1188 mm

**Approvals**

**Ordering details**

<table>
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<tr>
<th>No.</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Distance between outermost beams: 0500-02 500 mm, 2-beam 0800-03 800 mm, 3-beam 0900-04 900 mm, 4-beam</td>
<td></td>
</tr>
</tbody>
</table>

Mounting brackets are included in the delivery.

**Note:**
- * only for resolution 30 mm

### Technical data

- Standards: IEC/EN 61496-1/-2
- Category: Type 4
- Enclosure: aluminium
- Enclosure dimensions: Ø 49 mm
- Connection: Connector plug
  - Emitter: M12, 4-pole
  - Receiver: M12, 8-pole
  - Muting sensors: 2 x connector plugs M8, 3-pole
  - Muting lamp: M8, 3-pole
- Max. cable length: 100 m / 1 Ω
- Protection class: IP67 to EN 60529
- Response time: 7 ... 28.5 ms (Depends on length and resolution)
- Detection sensitivity:
  - (Resolution): 14 and 30 mm
- Protection field height:
  - Resolution 14 mm 170 ... 1450 mm
  - Resolution 30 mm 170 ... 1770 mm
  - 2-, 3-, 4-beam 500, 800, 900 mm
- Start/restart interlock: Integrated
- Contactor control: Integrated
- Muting and override function: Integrated
- Muting sensors: 2 or 4 external sensors
- Light emission wavelength: 880 nm (infrared)
- Ue: 24 VDC ± 10%
- Safety outputs: 2 x PNP, 500 mA
- Power consumption:
  - Emitter 4 W
  - Receiver 8 W
- Data interface: RS 485
- Status and diagnostics: LED display
- Ambient temperature: -10 °C ... +50 °C
- Storage and transport temperature: -20 °C ... +70 °C
- Classification:
  - Standards: EN ISO 13849-1; IEC 61508; IEC 60947-5-3
  - PL: up to e
  - Category: up to 4
  - PFH-value: 7.42 x 10^-9 /h
  - SIL: up to 3
  - Service life: 20 years

### Connector details

For more information, see our online product catalog: www.usa.schmersal.net

For more information, see our online product catalog: www.usa.schmersal.net
Safety light curtains and safety light grids

SLG 425-IP

• Safety light grid
  • Emitter and receiver in one enclosure (retro reflector)
  • Type 4 to IEC/EN 61496-1, -2
  • Protection field heights 500 mm
  • 2-beam light grid
  • Integrated start/restart interlock
  • Integrated muting and override function
  • Range 0.3 m … 7 m
  • Fail-safe transistor outputs
  • Status display
  • Protection class IP67

Technical data

- Standards: IEC/EN 61496-1/-2
- Category: Type 4
- Enclosure: aluminum
- Enclosure dimensions: Ø 49 mm
- Deflecting mirror: 50 x 50 x 606 mm
- Connection: Connector plug
- Max. cable length: 100 m / 1 Ω
- Protection class: IP67 to EN 60529
- Response time: 15 ms
- Detection sensitivity (Resolution): 500 mm
- Protection field height: 500 mm
- Protection field width, Range: 0.3 m … 7 m
- Start/restart interlock: Integrated
- Light emission wavelength: 880 nm (infrared)
- Ue: 24 VDC ± 10%
- Safety outputs: 2 x PNP, 500 mA
- Power consumption: 10 W
- Data interface: RS 485
- Status and diagnostics: LED display
- Ambient temperature: -10 °C … +50 °C
- Storage and transport temperature: -20 °C … +70 °C

Classification:

- Standards: EN ISO 13849-1; IEC 61508;
  IEC 60947-5-3
- PL: up to e
- Category: up to 4
- PFH-value: 7.42 x 10^-9 /h
- SIL: up to 3
- Service life: 20 years

Approvals

TUV

Ordering details

SLG 425IP-E/R0500-02-RF
ULS-P-0501

Light grid
Deflecting mirror

Note
Mounting brackets are included in the delivery.

Note
Converter for the parametrization NSR 0801

Ordering details

Connector:
Female connector M12, 8-pole straight
- cable length 5 m
- cable length 10 m
- cable length 20 m
Safety light curtains and safety light grids

**LF 50-11P**

- Muting sensor for Safety Light Curtains
- Range up to 5.5 m
- Connector plug can be rotated
- LED status display
- Protection class IP67
- Infrared light 660 nm
- Laser protection class 1
- Polarisation filter
- Antivalent switching outputs

**Technical data**

- Standards: EN 60974-5-2
- Laser protection class 1: EN 60825-1-10/03
- Enclosure: ABS
- Enclosure dimensions: 50 x 50 x 17 mm
- Connection: M12, 4-pole, can be rotated
- Max. cable length: 100 m
- Protection class: IP67
- Switching frequency: 2500 Hz
- Range: 0 ... 5.5 m
- Infrared laser light: 660 nm
- $U_e$: 10 ... 30 VDC
- Switching output: 2 x PNP 200 mA
- Beam diameter: 5 ... 24 mm
- LED status display: soiling, switching condition and power on
- Ambient temperature: -20 °C ... +60 °C
- Storage and transport temperature: -20 °C ... +80 °C

**Approvals**

**Ordering details**

**LF 50-11P**

**Note:**
System components (cables, mounting angles, etc.) not included in the delivery.

- Connector M12, 4-pole straight
  - without cable: KD M12-4
  - with cable 2 m: KD M12-4-2M
  - with cable 5 m: KD M12-4-5M

- Connecting cable to connect SLG 425I
  - M12, 4-pole to M8, 3-pole, 2 m: KA-0965

**System components**

- Reflector R 51 x 61-L
- Reflector R D83
- Mounting angle BF 50
- Mounting angle BF UNI 1

For more information, see our online product catalog: www.usa.schmersal.net
Safety light curtains and safety light grids

**SLC 420 standard**

- Safety light curtain
- Type 4 to IEC/EN 61496-1,-2
- Resolution 14, 30 and 50 mm
- Protection field heights 170 mm ... 1770 mm
- Integrated start/restart interlock
- Integrated contactor control
- Integrated blanking function
  (fixed and mobile blanking)
- Diagnostic and parameterization interface
- Fail-safe transistor outputs
- Optical synchronisation
- Status display
- Protection class IP67

**Technical data**

- Standards: IEC/EN 61496-1/-2
- Category: Type 4
- Enclosure: aluminum
- Enclosure dimensions: Ø 49 mm
- Connection: Connector plug
- Emitter: M12, 4-pole
- Receiver: M12, 8-pole
- Max. cable length: 100 m / 1 Ω
- Protection class: IP67 to EN 60529
- Response time: 10 ... 27 ms (depends on length and resolution)
- Detection sensitivity (Resolution): 14, 30 and 50 mm
- Protection field height:
  - Resolution 14 mm 170 ... 1450 mm
  - Resolution 30, 50 mm 170 ... 1770 mm
  - 2-, 3-, 4-beam 500, 800, 900 mm
- Start/restart interlock: Integrated
- Contactor control: Integrated
- Blanking function: Integrated
- Cascading: (Master/Slave)
- Light emission wavelength: 880 nm (infrared)
- Ue: 24 VDC ± 10%
- Safety outputs: 2 x PNP, 500 mA
- Power consumption:
  - Emitter 4 W,
  - Receiver 8 W
- Data interface: RS 485
- Status and diagnostics: LED display
- Ambient temperature: -10 °C ... +50 °C
- Storage and transport temperature: -20 °C ... +70 °C
- Classification:
  - Standards: EN ISO 13849-1; IEC 61508;
    IEC 60947-5-3
  - PL: up to e
  - Category: up to 4
  - PFH-value: 7.42 x 10^-9 /h
  - SIL: up to 3
  - Service life: 20 years

**Ordering details**

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<td></td>
</tr>
<tr>
<td>14, 30, 50</td>
<td>Resolution 14, 30, 50 mm</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Range 0.3 m ... 7 m**</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Range 0.3 m ... 10 m *</td>
<td></td>
</tr>
<tr>
<td>H***</td>
<td>High Range 0.3 m ... 18 m</td>
<td></td>
</tr>
</tbody>
</table>

Legend: A = Total length
2-beam A = 734.5 mm
3 and 4-beam A = 1054.5 mm

**SLG 420 standard**

- Safety light grid
- 2-, 3- or 4-beam light grid
- Range 0.3 ... 40 m

**Technical data**

- Standards: IEC/EN 61496-1/-2
- Category: Type 4
- Enclosure: aluminum
- Enclosure dimensions: Ø 49 mm
- Connection: Connector plug
- Emitter: M12, 4-pole
- Receiver: M12, 8-pole
- Max. cable length: 100 m / 1 Ω
- Protection class: IP67 to EN 60529
- Response time: 10 ... 27 ms (depends on length and resolution)
- Detection sensitivity (Resolution): 14, 30 and 50 mm
- Protection field height:
  - Resolution 14 mm 0.3 m ... 7 m
  - Resolution 30, 50 mm 0.3 m ... 10 m
  - High Range/Resolution 30 mm 0.3 m ... 18 m
  - 2-, 3-, 4-beam 8 m ... 40 m
- Start/restart interlock: Integrated
- Contactor control: Integrated
- Blanking function: Integrated
- Cascading: (Master/Slave)
- Light emission wavelength: 880 nm (infrared)
- Ue: 24 VDC ± 10%
- Safety outputs: 2 x PNP, 500 mA
- Power consumption:
  - Emitter 4 W,
  - Receiver 8 W
- Data interface: RS 485
- Status and diagnostics: LED display
- Ambient temperature: -10 °C ... +50 °C
- Storage and transport temperature: -20 °C ... +70 °C
- Classification:
  - Standards: EN ISO 13849-1; IEC 61508;
    IEC 60947-5-3
  - PL: up to e
  - Category: up to 4
  - PFH-value: 7.42 x 10^-9 /h
  - SIL: up to 3
  - Service life: 20 years

**Ordering details**

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<td></td>
</tr>
<tr>
<td>2</td>
<td>Range 0.3 m ... 18 m</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Range 8 m ... 40 m</td>
<td></td>
</tr>
</tbody>
</table>

Mounting brackets are included in the delivery.

**Note:**
* only for resolution 30 mm, 50 mm
** only for resolution 14 mm
*** only for resolution 30 mm

Converter for the parametrization NSR 0801

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For more information, see our online product catalog: www.usa.schmersal.net

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For more information, see our online product catalog: www.usa.schmersal.net
Safety light curtains and safety light grids

SLC 420 Master / Slave

- Safety light curtain
- Type 4 to IEC/EN 61496-1, -2
- Resolution 14, 30 and 50 mm
- Protection field height:
  - Master 170 mm ... 1770 mm
  - Slave 170 mm ... 650 mm
- Integrated start/restart interlock
- Integrated contactor control
- Integrated blanking function
- Diagnostic and parametrization interface
- Cascading of Master and Slave devices
- Range 0.3 m ... 18 m
- Fail-safe transistor outputs
- Optical synchronisation
- Status display

Technical data

- Standards: IEC/EN 61496-1/-2
- Category: Type 4
- Enclosure: aluminum
- Enclosure dimensions: Ø 49 mm
- Connection: Connector plug
  - Master emitter: M12, 4-pole
  - Master receiver: M12, 8-pole
  - Slave emitter: M12, 4-pole
  - Slave receiver: M12, 8-pole
- Max. cable length: 100 m / 1 Ω
- Max. cable length: (Master/Slave) 0.8 m
- Protection class: IP67 to EN 60529
- Response time: 10 … 37 ms (Depends on length and resolution)
- Detection sensitivity (Resolution): 14, 30 and 50 mm
- Protection field height:
  - Resolution 14 mm 170 ... 2100 mm
  - Resolution 30, 50 mm 170 ... 2420 mm
- Protection field width, Range:
  - Resolution 14 mm 0.3 m ... 7 m
  - Resolution 30, 50 mm 0.3 m ... 10 m
  - High Range 0.3 m ... 18 m
- Start/restart interlock: Integrated
- Contactor control: Integrated
- Blanking function: Integrated
- Cascading: (Master/Slave) Possible
- Light emission wavelength: 880 nm (infrared)
- Ue: 24 VDC ± 10%
- Safety outputs: 2 x PNP, 500 mA
- Power consumption: Emitter 4 W, Receiver 8 W
- Data interface: RS 485
- Status and diagnostics: LED display
- Ambient temperature: -10 °C … +50 °C
- Storage and transport temperature: -20 °C … +70 °C
- Classification:
  - Standards: EN ISO 13849-1; IEC 61508;
    IEC 60947-5-3
  - PL: up to e
  - Category: up to 4
  - PFH-value: 7.42 x 10⁻⁹/h
  - SIL: up to 3
  - Service life: 20 years

System components

Connector

Ordering details

SLC 420-E/R-①-②-RFB-③④

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
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<tbody>
<tr>
<td>①</td>
<td>xxxx</td>
<td>Protected heights (mm) available lengths: 0170, 0250, 0330, 0410, 0490, 0570, 0650, 0730, 0810, 0890, 0970, 1050, 1130, 1210, 1290, 1370, 1450, 1530*, 1610*, 1690*, 1770*</td>
</tr>
<tr>
<td>②</td>
<td>14, 30, 50</td>
<td>Resolution 14, 30, 50 mm Range 0.3 m ... 7 m** Range 0.3 m ... 10 m* High Range 0.3 m ... 18 m</td>
</tr>
<tr>
<td>③</td>
<td>H*</td>
<td>Converter for the parametrization NSR 0801</td>
</tr>
</tbody>
</table>

Ordering details

SLC 420-E/R-①-②-RFB-③④

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<tbody>
<tr>
<td>①</td>
<td>M</td>
<td>Master function</td>
</tr>
<tr>
<td>②</td>
<td>S***</td>
<td>Slave function</td>
</tr>
</tbody>
</table>

Mounting brackets are included in the delivery.

Note:
* only for resolution 30 and 50 mm
** only for resolution 14 mm
*** Protection field heights 170 ... 650 mm

Ordering details

Connector:
- Female connector M12, 4-pole straight for emitter cable length 5 m KA-0804 for cable length 10 m KA-0805 for cable length 20 m KA-0808
- Female connector M12, 8-pole straight for receiver cable length 5 m KA-0904 for cable length 10 m KA-0905 for cable length 20 m KA-0908

for Master/Slave connection:
- Female connector M12, 8-pole straight for emitter cable length 0.8 m KA-0810 for receiver cable length 0.8 m KA-0901

For more information, see our online product catalog: www.usa.schmersal.net
Safety light curtains and safety light grids

**SLC 420 IP69K**
- **Safety light curtain**
  - Type 4 to IEC/EN 61496-1, -2
  - Resolution 14 mm, 30 mm
  - Protection field heights 170 mm ... 1450 mm
  - Protection class IP69K
  - Integrated start/restart interlock
  - Integrated contactor control
  - Integrated blanking function (fixed and mobile blanking)
  - Diagnostic and parameterization interface
  - Range 0.3 m ... 10 m
  - Fail-safe transistor outputs
  - Optical synchronisation
  - Status display

Legend: A = Total length
A = 97 mm + Protection field height

**Technical data**
- Standards: IEC/EN 61496-1/-2
- Category: Type 4
- Enclosure: aluminum protective tube housing PMMA
- Enclosure dimensions: Ø 60 mm
- Connection: Cable (5 m) with
  - Receiver connector M12, 8-pole
  - Emitter connector M12, 4-pole
- Max. cable length: 100 m / 1 Ω
- Protection class: IP69K to EN 60529
- Response time: 10 ... 27 ms (depends on length and resolution)
- Detection sensitivity (Resolution): 14, 30 mm
- Protection field height:
  - Resolution 14, 30 mm 170 ... 1450 mm
  - 2-, 3-, 4-beam 500, 800, 900 mm
- Protection field width, Range:
  - Resolution 14 mm 0.3 m ... 7 m
  - Resolution 30 mm 0.3 m ... 10 m
  - 2-, 3-, 4-beam 0.3 m ... 18 m
- Start/restart interlock: Integrated
- Contactor control: Integrated
- Blanking function: Integrated
- Cascading: (Master/Slave)
- Light emission wavelength: 880 nm (infrared)
- Ue: 24 VDC ± 10%
- Safety outputs: 2 x PNP, 500 mA
- Power consumption:
  - Emitter 4 W,
  - Receiver 8 W
- Data interface: RS 485
- Status and diagnostics: LED display
- Ambient temperature: -10 °C ... +50 °C
- Storage and transport temperature: -20 °C ... +70 °C
- Classification:
  - Standards: EN ISO 13849-1; IEC 61508; IEC 60947-5-3
  - PL: up to e
  - Category: up to 4
  - PFH-value: 7.42 x 10⁻⁹/h
  - SIL: up to 3
  - Service life: 20 years

**SLG 420 IP69K**
- **Safety light grid**
  - 2-, 3- or 4-beam light grid
  - Range 0.3 ... 18 m

Legend: A = Total length
2-beam A = 747 mm
3 and 4-beam A = 1067 mm

**Approvals**

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
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<td>Protected heights (mm) available lengths: 0170, 0250, 0330, 0410, 0490, 0570, 0650, 0730, 0810, 0890, 0970, 1050, 1130, 1210, 1290, 1370, 1450</td>
</tr>
<tr>
<td>2</td>
<td>14</td>
<td>Resolution 14 mm with a range of 0.3 m ... 7 m</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>Resolution 30 mm with a range of 0.3 m ... 10 m</td>
</tr>
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</table>

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Distance between outermost beams: 0500-02 500 mm, 2-beam 0800-03 800 mm, 3-beam 0900-04 900 mm, 4-beam</td>
<td></td>
</tr>
</tbody>
</table>

Mounting brackets (V4A) are included in the delivery.

**Note:**
- Converter for the parametrization NSR 0801

For more information, see our online product catalog: www.usa.schmersal.net
Safety light curtains and safety light grids

SLG 422-P

- Safety light grid
- Emitter and receiver in one enclosure (retro reflector)
- Type 4 to IEC/EN 61496-1/-2
- Protection field heights 500 mm
- 2-beam light grid
- Integrated start/restart interlock
- Integrated contactor control
- Range 0.3 m ... 7 m
- Fail-safe transistor outputs
- Status display
- Protection class IP67

**Technical data**

<table>
<thead>
<tr>
<th>Standards:</th>
<th>IEC/EN 61496-1/-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category:</td>
<td>Type 4</td>
</tr>
<tr>
<td>Enclosure:</td>
<td>aluminum</td>
</tr>
<tr>
<td>Enclosure dimensions:</td>
<td>Ø 49 mm</td>
</tr>
<tr>
<td>Deflecting mirror:</td>
<td>50 x 50 x 606 mm</td>
</tr>
<tr>
<td>Connection:</td>
<td>Connector plug M12, 8-pole</td>
</tr>
<tr>
<td>Max. cable length:</td>
<td>100 m / 1 Ω</td>
</tr>
<tr>
<td>Protection class:</td>
<td>IP67 to EN 60529</td>
</tr>
<tr>
<td>Response time:</td>
<td>10 ms</td>
</tr>
<tr>
<td>Detection sensitivity (Resolution):</td>
<td>500 mm</td>
</tr>
<tr>
<td>Protection field height:</td>
<td>500 mm</td>
</tr>
<tr>
<td>Protection field width, Range:</td>
<td>0.3 m ... 7 m</td>
</tr>
<tr>
<td>Start/restart interlock:</td>
<td>Integrated</td>
</tr>
<tr>
<td>Contactor control:</td>
<td>Integrated</td>
</tr>
<tr>
<td>Light emission wavelength:</td>
<td>880 nm (infrared)</td>
</tr>
<tr>
<td>$U_e$:</td>
<td>24 VDC ± 10%</td>
</tr>
<tr>
<td>Safety outputs:</td>
<td>2 x PNP, 500 mA</td>
</tr>
<tr>
<td>Power consumption:</td>
<td>10 W</td>
</tr>
<tr>
<td>Data interface:</td>
<td>-</td>
</tr>
<tr>
<td>Status and diagnostics:</td>
<td>LED display</td>
</tr>
<tr>
<td>Ambient temperature:</td>
<td>-10 °C ... +50 °C</td>
</tr>
<tr>
<td>Storage and transport temperature:</td>
<td>-20 °C ... +70 °C</td>
</tr>
</tbody>
</table>

**Classification**

| Standards: | EN ISO 13849-1; IEC 61508; IEC 60947-5-3 |
| PL: | up to e |
| Category: | up to 4 |
| PFH-value: | $7.42 \times 10^{-9}$/h |
| SIL: | up to 3 |
| Service life: | 20 years |

**Approvals**

<table>
<thead>
<tr>
<th>TÜV</th>
<th>UL</th>
<th>CE</th>
</tr>
</thead>
</table>

**Ordering details**

<table>
<thead>
<tr>
<th>SLG 422-P-E/R0500-02-RF</th>
<th>Light grid</th>
</tr>
</thead>
<tbody>
<tr>
<td>ULS-P-0501</td>
<td>Deflecting mirror</td>
</tr>
</tbody>
</table>

**Note**

Mounting brackets are included in the delivery.

| Note: | Converter for the parametrization NSR 0801 |

**Ordering details**

<table>
<thead>
<tr>
<th>Connector:</th>
<th>Female connector M12, 8-pole straight</th>
</tr>
</thead>
<tbody>
<tr>
<td>KA-0904</td>
<td>cable length 5 m</td>
</tr>
<tr>
<td>KA-0905</td>
<td>cable length 10 m</td>
</tr>
<tr>
<td>KA-0908</td>
<td>cable length 20 m</td>
</tr>
</tbody>
</table>
Safety light curtains and safety light grids

**SLC 220 standard**
- Safety light curtain
  - Type 2 to IEC/EN 61496-1/-2
  - Resolution 30 and 80 mm
  - Protection field heights 175 mm … 1675 mm
  - Integrated start/restart interlock
  - Integrated contactor control
  - Integrated blanking function
  - Diagnostic and parametrization interface
  - Range 0.3 m … 14 m
  - Fail-safe transistor outputs
  - Status display
  - Protection class IP65
  - Signaling output

**Technical data**
- Standards: IEC/EN 61496-1/-2
- Category: Type 2
- Enclosure: aluminum
- Enclosure dimensions: Ø 40 mm
- Connection: Connector plug M12, 8-pole
- Max. cable length: 100 m / 1Ω
- Protection class: IP65 to EN 60529
- Response time: 9 … 45 ms (depends on length and resolution)
- Detection sensitivity (Resolution):
  - Protection field height: 30 and 80 mm
  - Resolution 30 mm: 175 … 1675 mm
  - Resolution 80 mm: 325 … 1675 mm
  - 2-, 3-, 4-beam: 500, 800, 900 mm

**SLG 220 standard**
- Safety light grid
  - 2-, 3- or 4-beam light grid
  - Range 0.3 … 30 m

**Legend:**
A = Total length
A = 78.5 mm + Distance between outermost beams

**Technical data**
- Standards: IEC/EN 61496-1/-2
- Category: Type 2
- Enclosure: aluminum
- Enclosure dimensions: Ø 40 mm
- Connection: Connector plug M12, 8-pole
- Max. cable length: 100 m / 1Ω
- Protection class: IP65 to EN 60529
- Response time: 9 … 45 ms (depends on length and resolution)
- Detection sensitivity (Resolution):
  - Protection field height: 30 and 80 mm
  - Resolution 30 mm: 175 … 1675 mm
  - Resolution 80 mm: 325 … 1675 mm
  - 2-, 3-, 4-beam: 500, 800, 900 mm

**Ordering details**

**SLC 220-E/R RFB-➀ ➁ ➂**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>xxxx</td>
<td>Protected heights (mm), available lengths: 0175*, 0250*, 0325, 0475, 0625, 0775, 0925, 1075, 1225, 1375, 1525, 1675</td>
</tr>
<tr>
<td>2</td>
<td>30, 80</td>
<td>Resolution 30, 80 mm</td>
</tr>
<tr>
<td>3</td>
<td>H</td>
<td>Range 0.3 m … 6 m</td>
</tr>
</tbody>
</table>

Note:
* only for resolution 30 mm

**SLG 220-E/R RFB-➀ ➁ ➂**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Distance between outermost beams: 0500-02</td>
<td>500 mm, 2-beam</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>0800-03</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>0900-04</td>
</tr>
<tr>
<td>2</td>
<td>H</td>
<td>Range 0.3 m … 6 m</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>High Range 5 m … 30 m</td>
</tr>
</tbody>
</table>

Mounting brackets are included in the delivery.

**Note:**
Converter for the parametrization NSR 0700

For more information, see our online product catalog: www.usa.schmersal.net
Safety light curtains and safety light grids

SLG 220-P

• Safety light grid
• Emitter and receiver in one enclosure (retro reflector)
• Type 2 to IEC/EN 61496-1, -2
• Protection field heights 500 mm
• 2-beam light grid
• Range 0.3 m ... 6 m
• Fail-safe transistor outputs
• Status display
• Protection class IP65

Technical data

| Standards: | IEC/EN 61496-1/-2 |
| Category: | Type 2 |
| Enclosure: | aluminum |
| Enclosure dimensions: | Ø 40 mm |
| Deflecting mirror: | 50 x 50 x 606 mm |
| Connection: | Connector plug M12, 8-pole |
| Max. cable length: | 100 m / 1 Ω |
| Protection class: | IP65 to EN 60529 |
| Response time: | 12 ms |
| Detection sensitivity (Resolution): | 500 mm |
| Protection field height: | 500 mm |
| Protection field width, Range: | 0.3 m ... 6 m |
| Light emission wavelength: | 880 nm (infrared) |
| Ue: | 24 VDC ± 10% |
| Safety outputs: | 2 x PNP, 200 mA |
| Signaling output: | PNP, 100 mA |
| Power consumption: | 10 W |
| Data interface: | - |
| Status and diagnostics: | LED display |
| Ambient temperature: | -10 °C ... +50 °C |
| Storage and transport temperature: | -20 °C ... +70 °C |

Classification:

| Standards: | EN ISO 13849-1; IEC 61508; IEC 60947-5-3 |
| PL: | up to d |
| Category: | up to 2 |
| PFH-value: | 3.59 x 10^-7/h |
| SIL: | up to 2 |
| Service life: | 20 years |

Approvals

Ordering details

SLG 220-P-E/R0500-02RF
ULS-P-0500

Light grid
Deflecting mirror

Note

Mounting brackets are included in the delivery.

Note:

Converter for the parametrization NSR 0700

Ordering details

Connector:

Female connector M12, 8-pole straight
- cable length 5 m
- cable length 10 m
- cable length 20 m

KA-0904
KA-0905
KA-0908
Safety light curtains and safety light grids

**SLC 220 Master / Slave**

- **Saf**ety light curtain
  - Type 2 to IEC/EN 61496-1/-2
  - Resolution 30 and 80 mm
  - Protection field height:
    - Master 175 mm ... 1675 mm
    - Slave 325 mm ... 775 mm
  - Integrated start/restart interlock
  - Integrated contactor control
  - Diagnostic and parametrization interface
  - Cascading of Master and Slave devices
  - Range 0.3 m ... 6 m
  - Fail-safe transistor outputs
  - Status display
  - Protection class IP65
  - Signaling output
  - Integrated self-test

**Technical data**

- Standards: IEC/EN 61496-1/-2
- Category: Type 2
- Enclosure: aluminum
- Enclosure dimensions: Ø 40 mm
- Connection: Connector plug
  - Master emitter: M12, 8-pole
  - Master receiver: M12, 8-pole
  - Slave emitter: M12, 6-pole
  - Slave receiver: M12, 6-pole
- Max. cable length: 100 m / 1Ω
- Max. cable length: (Master/Slave) 0.3 m
- Protection class: IP65 to EN 60529
- Response time: 12 ... 65 ms (depends on length and resolution)

- Detection sensitivity
- (Resolution):
  - Resolution 30 mm 30 and 80 mm
  - Resolution 80 mm 30 and 80 mm
  - Protection field height:
    - Resolution 30 mm 175 ... 2450 mm
    - Resolution 80 mm 325 ... 2450 mm
  - Protection field width, Range: 0.3 ... 6 m
- Start/restart interlock: Integrated
- Contactor control: Integrated
- Cascading: (Master/Slave) Possible
- Light emission wavelength: 880 nm (infrared)
- Ue: 24 VDC ± 10%
- Safety outputs: 2 x PNP, 200 mA
- Signaling output: PNP, 100 mA
- Power consumption:
  - Emitter 4 W,
  - Receiver 8 W
- Data interface: RS 485
- Status and diagnostics: LED display
- Ambient temperature: -10 °C ... +50 °C
- Storage and transport temperature:
  - -20 °C ... +70 °C

**Classification**

- Standards: EN ISO 13849-1; IEC 61508;
  - IEC 60947-5-3
- PL: up to d
- Category: up to 2
- PFH-value: 3.59 x 10⁻⁸/h
- SIL: up to 2
- Service life: 20 years

**System components**

- Connector

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>xxxx</td>
<td>Protected heights (mm), available lengths: 0175*, 0250*, 0325, 0475, 0625, 0775, 0925, 1075, 1225, 1375, 1525, 1675</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>Resolution 30mm</td>
</tr>
<tr>
<td></td>
<td>80</td>
<td>Resolution 80mm</td>
</tr>
<tr>
<td>②</td>
<td>M</td>
<td>Master function</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>Slave function**</td>
</tr>
</tbody>
</table>

**Note:**

* only for resolution 30 mm
** only protected heights 325 mm ... 775 mm

Converter for the parametrization NSR 0700

Different lengths and resolutions can be combined for Master/Slave.

Mounting brackets are included in the delivery.
**Safety light curtains and safety light grids**

**SLC 220 IP69K**

- **Safety light curtain**
  - Type 2 to IEC/EN 61496-1, -2
  - Resolution 30 and 80 mm
  - Protection field heights 175 mm ... 1675 mm
  - Protection class IP69K
  - Integrated start/restart interlock
  - Integrated contactor control
  - Integrated blanking function
  - Diagnostic and parametrization interface
  - Fail-safe transistor outputs
  - Status display
  - Signaling output

**SLG 220 IP69K**

- **Safety light grid**
  - 2-, 3- or 4-beam light grid
  - Range 0.3 ... 30 m

**Technical data**

- **Standards:** IEC/EN 61496-1/-2
- **Category:** Type 2
- **Enclosure:** aluminum protective tube housing PMMA
- **Enclosure dimensions:** Ø 60 mm
- **Connection:** Cable (5 m) with connector M12, 8-pole
- **Max. cable length:** 100 m / 1Ω
- **Protection class:** IP69K
- **Response time:** 9 ... 45 ms (depends on length and resolution)

 Detection sensitivity (Resolution): 30 and 80 mm
- Resolution 30 mm: 175 ... 1675 mm
- Resolution 80 mm: 325 ... 1675 mm
- 2-, 3-, 4-beam: 500, 800, 900 mm

- **Protection field width, ** Range: 0.3 ... 6 m (Standard), 4 ... 14 m (High range), 5 ... 30 m (High range)

- **Start/restart interlock:** Integrated
- **Contactor control:** Integrated
- **Blanking function:** Integrated
- **Light emission wavelength:** 880 nm (infrared)
- **Ue:** 24 VDC ± 10%
- **Safety outputs:** 2 x PNP, 200 mA
- **Signaling output:** PNP, 100 mA
- **Power consumption:** Emitter 4 W, Receiver 8 W
- **Data interface:** RS 485
- **Status and diagnostics:** LED display
- **Ambient temperature:** -10 °C ... +50 °C
- **Storage and transport temperature:** -20 °C ... +70 °C

- **Classification:**
  - **Standards:** EN ISO 13849-1; IEC 61508; IEC 60947-5-3
  - **PL:** up to d
  - **Category:** up to 2
  - **PFH-value:** 3.59 x 10^-8/h
  - **SIL:** up to 2
  - **Service life:** 20 years

**Approvals**

- TÜV
- CE

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>xxxx</td>
<td>Protected heights (mm), available lengths: 0175*, 0250*, 0325, 0475, 0625, 0775, 0925, 1075, 1225, 1375, 1525, 1675</td>
</tr>
<tr>
<td>②</td>
<td>30</td>
<td>Resolution 30 mm</td>
</tr>
<tr>
<td>③</td>
<td>80</td>
<td>Resolution 80 mm</td>
</tr>
<tr>
<td>④</td>
<td>H</td>
<td>Range 0.3 m ... 6 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High Range 4 m ... 14</td>
</tr>
</tbody>
</table>

* only for resolution 30 mm

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**SLG 220-E/R①-69-RFB③**

**Ordering details**

<table>
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<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Distance between outermost beams: 0500-02 0800-03 0900-04</td>
<td>500 mm, 2-beam 800 mm, 3-beam 900 mm, 4-beam</td>
</tr>
<tr>
<td>②</td>
<td>H</td>
<td>Range 0.3 m ... 6 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High Range 5 m ... 30 m</td>
</tr>
</tbody>
</table>

**Approvals**

- TÜV
- CE

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Connector: Female connector M12, 8-pole straight cable length 5 m KA-0904</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>cable length 10 m KA-0905</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cable length 20 m KA-0908</td>
</tr>
</tbody>
</table>

Mounting brackets (V4A) are included in the delivery.

**Note:** Converter for the parametrization NSR 0700

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For more information, see our online product catalog: www.usa.schmersal.net

4-15
## Safety light curtains and safety light grids

### System components

<table>
<thead>
<tr>
<th>Programming cable</th>
<th>Mounting kit MS-1100</th>
<th>Mounting kit MS-1073</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Programming cable" /></td>
<td><img src="image2" alt="Mounting kit MS-1100" /></td>
<td><img src="image3" alt="Mounting kit MS-1073" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alignment kit EA-5</th>
<th>Mounting kit MS-1031</th>
<th>Vibration damper</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image4" alt="Alignment kit EA-5" /></td>
<td><img src="image5" alt="Mounting kit MS-1031" /></td>
<td><img src="image6" alt="Vibration damper" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Muting lamp with wall bracket</th>
<th>Mounting kit MS-1100</th>
<th>Test rod PLS-01, PLS-02</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image7" alt="Muting lamp with wall bracket" /></td>
<td><img src="image8" alt="Mounting kit MS-1100" /></td>
<td><img src="image9" alt="Test rod PLS-01, PLS-02" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mounting kit MS-1000 / MS 1072</th>
<th>Mounting kit MS-1051</th>
<th>Muting Connection Unit MCU-02</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image10" alt="Mounting kit MS-1000 / MS 1072" /></td>
<td><img src="image11" alt="Mounting kit MS-1051" /></td>
<td><img src="image12" alt="Muting Connection Unit MCU-02" /></td>
</tr>
</tbody>
</table>

### Ordering details

<table>
<thead>
<tr>
<th>Programming cable</th>
<th>Mounting kits</th>
<th>Mounting kit for deflecting mirror</th>
</tr>
</thead>
<tbody>
<tr>
<td>for SLC/SLG 440</td>
<td>KA-0974</td>
<td>ULS-M: 2 brackets with screws</td>
</tr>
<tr>
<td>for SLC/SLG 445</td>
<td>KA-0976</td>
<td>ULS-A4: 2 brackets with screws</td>
</tr>
<tr>
<td>Laser alignment tool</td>
<td>EA5</td>
<td>Vibration damper (set of 8)</td>
</tr>
<tr>
<td>for SLC / SLG</td>
<td></td>
<td>for SLC/SLG 220</td>
</tr>
<tr>
<td>Muting lamp with wall bracket</td>
<td>MK2</td>
<td>for SLC/SLG 420-425 (central fixation)</td>
</tr>
<tr>
<td>for SLC/SLG 425I</td>
<td>MK6</td>
<td>for SLC/SLG 420-425 (lateral fixation)</td>
</tr>
<tr>
<td>for SLC/SLG 445</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mounting kit for SLC /SLG 220</td>
<td>MS-1000</td>
<td>Test rod</td>
</tr>
<tr>
<td>4 x angle incl. screws</td>
<td>MS-1072</td>
<td>for resolution 30 mm</td>
</tr>
<tr>
<td>2 x angle incl. screws</td>
<td></td>
<td>for resolution 14 mm</td>
</tr>
<tr>
<td>Mounting kits</td>
<td></td>
<td>Muting Connection Unit</td>
</tr>
<tr>
<td>for SLC/SLG 440/445</td>
<td>MS-1100</td>
<td>to connect 4 muting sensors</td>
</tr>
<tr>
<td>4 angle end brackets with screws</td>
<td>MS-1030</td>
<td></td>
</tr>
<tr>
<td>2 U-shaped side brackets</td>
<td>MS-1100</td>
<td></td>
</tr>
<tr>
<td>4 angle brackets, with screws</td>
<td>MS-1038</td>
<td></td>
</tr>
<tr>
<td>for SLC/SLG 420-425 (central fixation)</td>
<td>MS-1051</td>
<td></td>
</tr>
<tr>
<td>4 angle brackets with screws</td>
<td></td>
<td></td>
</tr>
<tr>
<td>for SLC/SLG 420-425 (lateral fixation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 angle brackets, includes screws and T-slot nuts</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: www.usa.schmersal.net
Safety light curtains and safety light grids

**System components**

- **Bus converter**
  - NSR-0001
  - NSR-0700

- **Deflecting mirror** ULS-A4, Ø 49 mm

- **Mounting stands** MST

- **Protective enclosure with deflecting mirror**

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**System components**

- **Deflecting mirror** ULS-M

- **Muting Carrier Set**

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**System components**

- **Protective enclosure**

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**Deflection Mirror Application Notes**

**ULS-M:** Must be used when range is greater than 6m. With 1 mirror, range reduced by 10%, with 2 or more mirrors range reduced by 15% for each mirror.

**ULS-A4:** Must be used when range is less than 6m. With a loss of 20% at each mirror, only 1 mirror per emitter/receiver pair is recommended.

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**Ordering details**

**Bus converter**

- Converter for the parametrization of SLC/SLG 420-425
  - USB 2.0 interface: NSR 0801
  - RS232 interface: NSR 0700

**Deflecting mirror ULS-M**

- Mirror height 200 mm: ULS-M-0200
- Mirror height 350 mm: ULS-M-0350
- Mirror height 500 mm: ULS-M-0500
- Mirror height 650 mm: ULS-M-0650
- Mirror height 800 mm: ULS-M-0800
- Mirror height 950 mm: ULS-M-0950
- Mirror height 1250 mm: ULS-M-1250
- Mirror height 1550 mm: ULS-M-1550
- Mirror height 1700 mm: ULS-M-1700

**Deflecting mirror ULS-A4 incl. mounting angle**

- Mirror height 200 mm: ULS-A4-0200
- Mirror height 400 mm: ULS-A4-0400
- Mirror height 550 mm: ULS-A4-0550
- Mirror height 700 mm: ULS-A4-0700
- Mirror height 850 mm: ULS-A4-0850
- Mirror height 1000 mm: ULS-A4-1000

**Mounting stands**

- Height including base 500 mm: MST-0500
- Height including base 750 mm: MST-0750
- Height including base 1000 mm: MST-1000
- Height including base 1250 mm: MST-1250
- Height including base 1500 mm: MST-1500
- Height including base 1750 mm: MST-1750
- Height including base 2000 mm: MST-2000

**Protective enclosure with deflecting mirror**

- Version for 2-beam light grid: ULS-ST2
- Version for 3-beam light grid: ULS-ST3
- Version for 4-beam light grid: ULS-ST4

**Protective enclosure for light grids/curtains**

- Powder coated steel: SG5, SG6
  - Height 1334 mm: SG5
  - Height 2134 mm: SG6

**Safety screen for protective enclosures (PMMA)**

- for SG5: height 1310 mm: SGS5
- for SG6: height 2110 mm: SGS6

**Deflecting mirror for protective enclosures**

- Mirror height 1000 mm: ULS-SG-1000
  - includes mounting hardware

**Muting sets (complete)**

- L version for MST stand: MUT-SET-L-01
- L version fixes to curtain: MUT-SET-L-02
  - includes arms, MCU-02, 2 sensors, cables
- T version for MST stand: MUT-SET-T-01
- T version fixes to curtain: MUT-SET-T-02
  - includes arms, MCU-02, 4 sensors, cables

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For more information, see our online product catalog: www.usa.schmersal.net
Safety light barriers

SLB 240

Technical data

Standards: EN 61496-1, EN 61496-2, EN ISO13849, EN 62061
Control Category: Type 2
Enclosure: aluminum
Enclosure dimensions: 27.8 x 33 x 72 mm
Connection:
- emitter: M12 connector, 4-pole
- receiver: M12 connector, 4-pole or 5-pole
Max. cable length: 50 m
Protection class: IP67
Response time: 7 ms ... 22 ms depending on beam coding/samplings
Range: 0.3 m ... 15 m
Function: Protective mode / Automatic, Restart interlock (manual reset), Setting mode
Light emission wavelength: 880 nm
Ue: 24 VDC ± 10%, 1A
Safety outputs: 2 x short circuit proof PNP semiconductor outputs
Angle of radiation: ± 5°
Min. size of object: 10 mm Ø
Ambient temperature: -30 °C ... +50 °C
Storage and transport temperature: -30 °C ... +70 °C

Classification:
Standards: EN ISO 13849-1; EN 62061
PL: up to c
Category: up to 2
PFH-value: 1.5 x 10⁶ /h
SIL: up to 1
Service life: 20 years

System components

Approvals

Ordering details

The system components (mounting brackets, cable, etc.) are not included in delivery.

Compatible Safety Controllers
SRB-E-201LC  SRB-E-201ST
SRB-E-301ST  SRB-E-212ST
SRB-E-322ST  SRB-E-204ST
SRB-E-204PE  SRB-E-402ST
SRB301MA     SRB301MC
SRB301ST     SRB324ST
SRB211ST

Ordering details

Connector: Female connector M12
for emitter & receiver (automatic restart)
4-pole cable, length 5 m  KA-0804
4-pole cable, length 10 m  KA-0805
4-pole cable, length 20 m  KA-0808
for receiver (restart interlock)
5-pole cable, length 5 m  101209949
5-pole cable, length 15 m  101209948
Cable for the parametrization
 cable length 1 m  KA-0977
Mounting kit
includes 2 brackets, 4 fixing screws  MS-1101

Ordering details

SLB 240-ER-1-2
Nr.  Option  Description
1    Beam coding 1
2    Beam coding 2
3    Beam coding 3
4    Beam coding 4
2ST  M12 connector
LST  200 mm cable with M12 connector

Note: beam coding 1 is standard (stocked) and can be changed in the field.

For more information, see our online product catalog: www.usa.schmersal.net

For more information, see our online product catalog: www.usa.schmersal.net
Safety light barriers

SLB 440

![Image of Safety Light Barrier SLB 440]

- Range 0.3 m to 15 m (18 m for H version)
- Field configurable extended range up to 75 m (H option)
- Compact rectangular housing profile
- Type 4 safe OSSD outputs
- Integrated connector or cable with connector
- Illuminated LED end cap status indicator
- Integrated start/restart interlock
- Visual alignment set-up tool
- 4 stage beam coding
- Protection class IP67
- Optional internal electric heater

Technical data

- Standards: EN 61496-1, EN 61496-2, EN ISO 13849, EN 62061
- Category: Type 4
- Enclosure: aluminum
- Enclosure dimensions: 27.8 x 33 x 72 mm
  (SLB440-H) 27.8 x 33 x 111 mm
- Connection:
  - emitter: M12 connector, 4-pole
  - receiver: M12 connector, 4-pole or 5-pole
- Max. cable length: 50 m
- Protection class: IP67
- Response time: 7 ms ... 22 ms depending on beam coding/samplings
- Range (without H): 0.3 m ... 15.0 m
- Range (with H): (factory setting) 0.3 m ... 18.0 m
  (Alternative range) 12.0 m ... 75.0 m
- Function: Protective mode / Automatic, Restart interlock (manual reset), Setting mode
- Light emission wavelength: 880 nm
- \( U_{c}: \) 24 VDC ±10%, 1A
- \( U_{e} \) (SLB440-H) 24 VDC ±10% controllable
  4A PELV mains unit in accordance with EN60204
- Safety outputs: 2 x short circuit proof PNP semiconductor outputs
- Angle of radiation: ±2.5°
- Min. size of object: 9 mm Ø
- Ambient temperature: -30 °C ... +50 °C
- Storage and transport temperature: -30 °C ... +70 °C

Classification:

- Standards: EN ISO 13849-1; EN 62061
- Category: up to 4
- PFH-value: 1.5 x 10^{-8} /h
- SIL: up to 3
- Service life: 20 years

Approvals

![TUV and CE Mark]

Ordering details

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<td>LST</td>
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<td>Alternative Range</td>
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Ordering details

The system components (mounting brackets, cable, etc.) are not included in delivery.

Compatible Safety Controllers

- SRB-E-201LC
- SRB-E-201ST
- SRB-E-301ST
- SRB-E-212ST
- SRB-E-322ST
- SRB-E-204ST
- SRB-E-204PE
- SRB-E-402ST
- SRB301MA
- SRB301MC
- SRB301ST
- SRB324ST
- SRB211ST

Note: beam coding 1 is standard (stocked) and can be changed in the field.
* Electric heater (EH) only possible with SLB440-H version

System components

- Connector plug
- Safety Controller
- Mounting kit MS-1101

Ordering details

- Connector: Female connector M12 for emitter & receiver (automatic restart)
  - 4-pole cable, length 5 m: KA-0804
  - 4-pole cable, length 10 m: KA-0805
  - 4-pole cable, length 20 m: KA-0808
- for receiver (restart interlock)
  - 5-pole cable, length 5 m: 101209949
  - 5-pole cable, length 15 m: 101209948
- Cable for the parametrization
  - cable length 1 m: KA-0977
- Mounting kit MS-1101
- Mounting kit (SLB440-H) MS-1100

For more information, see our online product catalog: www.usa.schmersal.net
Safety monitoring modules
Safety monitoring modules and control systems

Safety controllers are designed to increase the level of safety in machine guarding and/or E-stop control circuits. They feature redundant, dual channel, cross monitoring logic circuits. These continuously check for, and detect, faults in the system’s safety circuit components and interconnection wiring.

Safety controllers are capable of detecting many types of potential safety circuit faults (depending on the model): Welded interlock/E-stop switch contacts; Open circuits, short circuits or ground faults; Faults in the modules safety relays; Faults in the modules monitoring circuits; Inadequate supply voltage; Welded or stuck contacts in the controlled output motor contactor or control relay; Capacitive or inductive interference on controller inputs.

Schmersal offers both conventional electro-mechanical relay based (AES) and unique microprocessor based (SRB) models.

For more information on Safety Controllers, please consult our online product catalog at www.usa.schmersal.net, under the Safe Signal Processing tab.
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1 Isolated Contacts: Galvanically separated contacts

For complete technical information, please visit www.usa.schmersal.net

For more information, see our online product catalog: www.usa.schmersal.net
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<td>✓</td>
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<td>—</td>
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<tr>
<td>AES 1165</td>
<td>3 (d)</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
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<tr>
<td>AES 1265</td>
<td>3 (d)</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>SRB 207 AN-24VDC</td>
<td>3 (d)</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
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<tr>
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<td>✓</td>
<td>✓</td>
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<td>—</td>
<td>✓</td>
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<tr>
<td>SRB 207 AN-230</td>
<td>3 (d)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>SRB-E-301ST</td>
<td>4 (e)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>SRB-E-201ST</td>
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<td>✓</td>
<td>✓</td>
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<tr>
<td>SRB-E-201LC</td>
<td>4 (e)</td>
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<td>✓</td>
<td>✓</td>
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<td>SRB-E-212ST</td>
<td>4 (e)</td>
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<tr>
<td>SRB-E-322ST</td>
<td>4 (e)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>SRB-E-204ST</td>
<td>4 (e)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Selectable</td>
</tr>
</tbody>
</table>

2 SRB 301LC/B: Performance Level e (Control Category 4) when used with a PLe input device which features self-monitoring
3 Safety Switch: Devices having dry contacts, e.g., keyed interlock switches with and without guardlocking, limit switches, cable pulls, hinge switches, foot switches, etc.
4 AOPD: Active Optical Protective Device, e.g. safety light curtain
5 Automatic: Safety outputs enabled as soon as safety inputs are satisfied (no reset signal required)
   *Manual: Safety outputs enabled when safety inputs are satisfied and reset signal supplied (0v to 24v transition)
   *Monitored Manual: Safety outputs enabled when safety inputs are satisfied and reset signal supplied (24v to 0v transition)

For more information, see our online product catalog: www.usa.schmersal.net
### Safe Speed Monitoring

<table>
<thead>
<tr>
<th>Monitored Speeds</th>
<th>Monitored Method</th>
<th>Operating Voltage</th>
<th>Model Code</th>
<th>Control Category (Performance Level)</th>
<th>Safety Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standstill</td>
<td>Timer</td>
<td>24VDC</td>
<td>AZS 2305-24VDC</td>
<td>4 (d)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>110VAC</td>
<td>AZS 2305-110VAC</td>
<td>4 (d)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>230VAC</td>
<td>AZS 2305-230VAC</td>
<td>4 (d)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>1 PNP Impulse Sensor</td>
<td>24VDC</td>
<td>FWS 1206</td>
<td>3 (d)</td>
<td>2</td>
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<tr>
<td></td>
<td></td>
<td>24-230VAC/DC</td>
<td>FWS 2106</td>
<td>3 (d)</td>
<td>1</td>
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<td></td>
<td></td>
<td>FWS 2506</td>
<td>3 (d)</td>
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<tr>
<td></td>
<td>2 PNP Impulse Sensors</td>
<td>24VDC</td>
<td>FWS 1205</td>
<td>3 (d)</td>
<td>2</td>
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<td></td>
<td>24-230VAC/DC</td>
<td>FWS 2105</td>
<td>3 (d)</td>
<td>1</td>
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<td>FWS 2505</td>
<td>3 (d)</td>
<td>4</td>
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<td></td>
<td></td>
<td>690VAC Back EMF</td>
<td>DN3PS2</td>
<td>4 (e)</td>
<td>2</td>
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<tr>
<td>Safe Speeds</td>
<td>Encoders/Resolver</td>
<td>2 PNP Impulse Sensors</td>
<td>24VDC</td>
<td>DNDS</td>
<td>4 (e)</td>
</tr>
</tbody>
</table>

### Mats/2-Hand Controls

<table>
<thead>
<tr>
<th>Operating Voltage</th>
<th>Type of Reset</th>
<th>Model</th>
<th>E-Stop</th>
<th>Safety Switch(^1)</th>
<th>Safety Mat(^2)</th>
<th>Two-Hand Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>24VAC/DC</td>
<td>Monitored Reset</td>
<td>SRB 301HC/R-24</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Auto Reset</td>
<td>SRB 301HC/T-24</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>—</td>
</tr>
<tr>
<td>48-230VAC</td>
<td>Monitored Reset</td>
<td>SRB 301HC/R-230</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Auto Reset</td>
<td>SRB 301HC/T-230</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>—</td>
</tr>
<tr>
<td>24VDC</td>
<td>Auto or Monitored</td>
<td>SRB-E-201ST</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

\(^1\) Devices having dry contacts, e.g., keyed interlock switches with and without guard locking, limit switches, cable pulls, hinge switches, foot switches, etc.

\(^2\) Safety mats operating with an electrical cross-short principle to detect actuation.

### Safety Edge Monitors

<table>
<thead>
<tr>
<th>Operating Voltage</th>
<th>Maximum Number of Edges Monitored</th>
<th>Model</th>
<th>Control Category (Performance Level)</th>
<th>Method of Reset</th>
</tr>
</thead>
<tbody>
<tr>
<td>24VDC</td>
<td>1</td>
<td>SE-400C</td>
<td>4 (e)</td>
<td>Trailing Edge</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>SE-100C</td>
<td>1 (c)</td>
<td>—</td>
</tr>
<tr>
<td>24VAC/DC</td>
<td>4</td>
<td>SE-304C</td>
<td>3 (d)</td>
<td>Trailing Edge</td>
</tr>
</tbody>
</table>

For complete technical information, please visit [www.usa.schmersal.net](http://www.usa.schmersal.net)
Input Expansion Modules

A majority of standard safety controllers used in the industry today will monitor 1 discrete device with 2 channels. Depending on the safety level to be obtained, wiring multiple switches in series to one safety controller can be a solution to scenarios such as an expanding application. This form of “daisy-chaining” however will not allow for individual diagnostics for low level safety device (i.e., limit switches) and can increase installation time and costs. Input expanders allow multiple devices to be wired to one safety controller while still having the ability of individual diagnostics. Multiple PROTECT input expanders can be used to wire a maximum of 80 dual channel devices.

For complete technical information, please visit www.usa.schmersal.net
Output Expansion Modules
Output expanders allow a safety controller to increase the number of safe signals that can be delivered. Each SRB-EM module will provide an additional 4 dry contact safety outputs, 2 dry contact auxiliary contacts and a connection to the main monitoring safety controller to complete an external feedback monitoring loop for the safety function.

<table>
<thead>
<tr>
<th>Output Expanders</th>
<th>Additional Safety Outputs</th>
<th>Additional Auxiliary Outputs</th>
<th>Terminal Connection</th>
<th>Operating Voltage</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4</td>
<td>2</td>
<td>Screw Terminals</td>
<td>24VAC/DC</td>
<td>SRB 402 EM</td>
</tr>
</tbody>
</table>

Dual Zone Monitoring
The SRB 202C and SRB 400C safety controllers allow for dual zone monitoring without adding the complexity of using a safety PLC. No software or programming tool is required for zone setup. Input 1 is reserved for a global shutdown (the release of all safety outputs) such as an E-Stop actuation. Input 2 is reserved for dropping out only half of the safety outputs of the relay. With the SRB-E-402ST the inputs can have different safety function configurations. These functions are set using the rotary mode switch 1 and 2.

<table>
<thead>
<tr>
<th>Safety Outputs</th>
<th>Auxiliary Outputs</th>
<th>Input 1 Contacts</th>
<th>Input 2 Contacts</th>
<th>Input 1 Reset</th>
<th>Input 1 Cross Short Monitoring</th>
<th>Model Code</th>
<th>Control Category (Performance Level)</th>
<th>E-Stop Monitoring</th>
<th>Safety Switch</th>
<th>Coded Magnetic Sensor</th>
<th>AOPD</th>
<th>Pulse Echo Compatible</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>1NO/1NC</td>
<td>2NC</td>
<td>Auto or Manual</td>
<td>No</td>
<td>SRB202CA</td>
<td>4 (e)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>—</td>
</tr>
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<td></td>
<td></td>
<td>Yes</td>
<td>SRB202CA/Q</td>
<td>4 (e)</td>
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<td>—</td>
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<tr>
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<td></td>
<td>Trailing Edge</td>
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<td>SRB202CA/QT</td>
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<td>✓</td>
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<td>—</td>
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<tr>
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<td>2</td>
<td>2NC</td>
<td>Auto or Manual</td>
<td>No</td>
<td>SRB202CS</td>
<td>4 (e)</td>
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<td>✓</td>
<td>✓</td>
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<td>—</td>
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<td></td>
<td></td>
<td></td>
<td>Trailing Edge</td>
<td>No</td>
<td>SRB202CS/T</td>
<td>4 (e)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>Selectable</td>
<td>2NC</td>
<td>Selectable/Two-Hand Controls</td>
<td>Auto or Trailing Edge</td>
<td>SRB-E-402ST</td>
<td>4 (e)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

1 Cross short monitoring and trailing edge not available for Input device 2.
2 Devices having dry contacts, e.g., keyed interlock switches with and without guard locking, limit switches, cable pulls, hinge switches, foot switches, etc.
3 AOPD: Active Optical Protective Device, e.g. safety light curtain

For complete technical information, please visit www.usa.schmersal.net
Safety monitoring modules

SRB-E-201LC

- Electronic safety controller
- 2 instant semi-conductor safety outputs
- 1 signaling semi-conductor output
- 10 configuration settings adjusting reset, cross-wire detection, input/output configuration
- LED status indication
- Coded plug-in terminal blocks
- Safe monitoring of E-STOP, safety guards, magnetic safety sensors, pull-wire emergency stops, electronic devices with OSSD

Technical data

Standards:
IEC/EN 60204-1, EN 60947-5-1; EN ISO 13849-1, IEC/EN 62061, IEC 61508

EMC rating:
to EMC Directive

Air clearances and creepage distances:
to IEC/EN 60664-1

Mounting:
standard DIN rail to EN 60715

Terminal designations:
EN 60947-1

Electrical characteristics:
Rated operating voltage $U_{e}$: 24 VDC ±20%, residual ripple max. 10%
Fuse rating for the operating voltage: we recommend a circuit breaker type Z (max. 16 A) or a fine fuse (max. 15 A, delayed action)
UL Rating of external fuse: max. 16 A, only use fuses in accordance with UL 248 series

Pull-in delay: < 150 ms
Drop-out delay in case of “emergency stop”: < 10 ms
Drop-out delay on “supply failure”: < 10 ms
Bridging in case of voltage drops: typ. 5 ms
Readiness after switching on voltage [s]: < 1.5 sec.

Control current circuits/inputs:
Inputs S12, S22: 24 VDC/8 mA
Inputs X2, X3, X7: 24 VDC/8 mA
Clock outputs S11, S21: > 20 VDC, 10 mA per output
Cable length: 1500 m with 1.5 mm²; 2500 m with 2.5 mm²
Conduction resistance: max. 40 Ω

Semi-conductor outputs:
Switching capacity of the safety outputs Q: max. 2 A
Voltage drop: < 0.5 V
Leakage current: < 1 mA
Max. fuse rating of the safety outputs: refer to “Operating voltage”
Test impulse to Q1, Q2: < 1 ms (negative); < 100 μs (positive)
Utilization category as per EN 60947-5-1: DC-13: 24 V / 2 A
Switching capacity of signaling outputs: semi-conductor output Y1: 24 VDC/100 mA
Fuse rating of the signaling outputs: internal electronic trip, tripping current > 100 mA
Max. switching cycles / minute: 60

Inductive consumers: provision is to be made for suitable protective wiring for suppression

Ambient conditions:
Operating ambient temperature: -25°C ... +80°C (non-condensing)
Storage and transport temperature: -40°C ... +85°C (non-condensing)
Protection class: enclosure: IP40, terminals: IP20, terminal clearance IP54
Mounting: snaps onto standard DIN rails to DIN EN 60715
Resistance to shock: 30 g / 11 ms
Resistance to vibrations to EN 60068-2-6: 10 ... 55 Hz, amplitude 0.35 mm
Altitude: max. 2,000 m
Dimensions (height/width/depth): 98 x 22.5 x 115 mm

Configuration Settings

<table>
<thead>
<tr>
<th>Rotary knob position</th>
<th>Reset button (detection of the trailing edge)</th>
<th>Cross-wire monitoring active</th>
<th>Input / Sensor configuration</th>
<th>Monitoring of sensor channels for synchronisation (&lt; 5 sec.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>Yes</td>
<td>NC / NC</td>
<td>Yes</td>
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<td>Yes</td>
<td>Yes</td>
<td>NC / NC</td>
<td>No</td>
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<tr>
<td>3</td>
<td>Yes</td>
<td>No</td>
<td>NC / NC</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>Yes</td>
<td>No</td>
<td>NC / NC</td>
<td>No</td>
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<tr>
<td>5</td>
<td>Yes</td>
<td>Yes</td>
<td>NC / NO</td>
<td>Yes</td>
</tr>
<tr>
<td>6</td>
<td>Autostart</td>
<td>Yes</td>
<td>NC / NO</td>
<td>No</td>
</tr>
<tr>
<td>7</td>
<td>Autostart</td>
<td>Yes</td>
<td>NC / NC</td>
<td>Yes</td>
</tr>
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<td>8</td>
<td>Autostart</td>
<td>Yes</td>
<td>NC / NC</td>
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</tr>
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<td>Autostart</td>
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<td>NC / NC</td>
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<td>C</td>
<td></td>
<td>Configuration mode</td>
<td></td>
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</tr>
</tbody>
</table>
Safety monitoring modules

SRB-E-201ST

- Electronic safety controller
- Configuration setting for two-hand controls
- 2 instant semi-conductor safety outputs
- 1 signaling semi-conductor output
- 11 configuration settings adjusting reset, cross-wire detection, input/output configuration
- LED status indication
- Coded plug-in terminal blocks
- Safe monitoring of E-STOP, safety guards, magnetic safety sensors, pull-wire emergency stops, electronic devices with OSSD

Technical data

Standards: IEC/EN 60204-1, EN 60947-5-1; EN ISO 13849-1, IEC/EN 62061, IEC 61508

EMC rating: to EMC Directive

Air clearances and creepage distances: to IEC/EN 60664-1

Mounting: standard DIN rail to EN 60715

Terminal designations: EN 60947-1

Electrical characteristics:

Rated operating voltage $U_o$: 24 VDC ±20%, residual ripple max. 10%

Fuse rating for the operating voltage: we recommend a circuit breaker type Z (max. 16 A) or a fine fuse (max. 15 A, delayed action)

UL Rating of external fuse: max. 16 A, only use fuses in accordance with UL 248 series

Pull-in delay: < 150 ms

Drop-out delay in case of "emergency stop": < 10 ms

Drop-out delay on "supply failure": < 10 ms

Bridging in case of voltage drops: typ. 5 ms

Readiness after switching on voltage [s]: < 1.5 sec.

Control current circuits/inputs:

Inputs S12, S22: 24 VDC/8 mA

Inputs X2, X3, X7: 24 VDC/8 mA

Clock outputs S11, S21: > 20 VDC, 10 mA per output

Cable length: 1500 m with 1.5 mm²; 2500 m with 2.5 mm²

Conduction resistance: max. 40 Ω

Semi-conductor outputs:

Switching capacity of the safety outputs Q: max. 5.5 A

Voltage drop: < 0.5 V

Leakage current: < 1 mA

Max. fuse rating of the safety outputs: refer to "Operating voltage"

Test impulse to Q1, Q2: < 1 ms (negative); < 100 μs (positive)

Utilization category as per EN 60947-5-1: DC-13: 24 V / 3.5 A

Switching capacity of signaling outputs: semi-conductor output Y1: 24 VDC/100 mA

Fuse rating of the signaling outputs: internal electronic trip, tripping current > 100 mA

Max. switching cycles / minute: 60

Inductive consumers: provision is to be made for suitable protective wiring for suppression

Ambient conditions:

Operating ambient temperature: -25°C ... +60°C (non-condensing)

Storage and transport temperature: -40°C ... +85°C (non-condensing)

Protection class: enclosure: IP40, terminals: IP20, terminal clearance IP54

Mounting: snaps onto standard DIN rails to DIN EN 60715

Resistance to shock: 30 g / 11 ms

Resistance to vibrations to EN 60068-2-6: 10 ... 55 Hz, amplitude 0.35 mm

Altitude: max. 2,000 m

Dimensions (height/width/depth): 98 x 22.5 x 115 mm

Configuration Settings

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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>Yes</td>
<td>NC / NC</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>Yes</td>
<td>Yes</td>
<td>NC / NC</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>Yes</td>
<td>No</td>
<td>NC / NC</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>Yes</td>
<td>No</td>
<td>NC / NC</td>
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<td>5</td>
<td>Yes</td>
<td>Yes</td>
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<td>7</td>
<td>Autostart</td>
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<td>Yes</td>
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<td>8</td>
<td>Autostart</td>
<td>Yes</td>
<td>NC / NC</td>
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<td>&lt; 0.5 sec. (upon actuation of setting elements)</td>
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</table>

For more information, see our online product catalog: www.usa.schmersal.net
Safety monitoring modules

**SRB-E-204ST**

- Electronic safety controller
- **Monitoring of up to 4 individual devices**
- 2 instant semi-conductor safety outputs
- 4 signaling semi-conductor outputs
- 14 configuration settings adjusting reset, cross-wire detection, input/output configuration
- LED status indication
- Coded plug-in terminal blocks
- Safe monitoring of E-STOP, safety guards, magnetic safety sensors, pull-wire emergency stops, electronic devices with OSSD

### Technical data

<table>
<thead>
<tr>
<th>Standards:</th>
<th>IEC/EN 60204-1, EN 60947-5-1; EN ISO 13849-1; IEC/EN 62061, IEC 61508</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMC rating:</td>
<td>to EMC Directive</td>
</tr>
<tr>
<td>Air clearances and creepage distances:</td>
<td>to IEC/EN 60664-1</td>
</tr>
<tr>
<td>Mounting:</td>
<td>standard DIN rail to EN 60715</td>
</tr>
<tr>
<td>Terminal designations:</td>
<td>EN 60947-1</td>
</tr>
</tbody>
</table>

**Electrical characteristics:**

- Rated operating voltage $U_{op}$: 24 VDC ±20%, residual ripple max. 10%
- Fuse rating for the operating voltage: we recommend a circuit breaker type Z (max. 16 A) or a fine fuse (max. 15 A, delayed action)
- UL Rating of external fuse: max. 16 A, only use fuses in accordance with UL 248 series
- Pull-in delay: < 150 ms
- Drop-out delay in case of "emergency stop": < 10 ms
- Drop-out delay on "supply failure": < 10 ms
- Bridging in case of voltage drops: typ. 5 ms
- Readiness after switching on voltage [s]: < 1.5 sec.

**Control current circuits/inputs:**

- Inputs S12, S22: 24 VDC/8 mA
- Inputs X2, X3, X7: 24 VDC/8 mA
- Clock outputs S11, S21: > 20 VDC, 10 mA per output
- Cable length: 1500 m with 1.5 mm²; 2500 m with 2.5 mm²
- Conduction resistance: max. 40 Ω

**Semiaconductor outputs:**

- Switching capacity of the safety outputs Q: max. 2 A
- Voltage drop: < 0.5 V
- Leakage current: < 1 mA
- Utilization category as per EN 60947-5-1: DC-13: 24 V / 2 A
- Switching capacity of signaling outputs: semi-conductor output Y1-Y4: 24 VDC/100 mA
- Fuse rating of the signaling outputs: internal electronic trip, tripping current > 100 mA
- Max. switching cycles / minute: 60
- Inductive consumers: provision is to be made for suitable protective wiring for suppression

**Ambient conditions:**

- Operating ambient temperature: -25°C ... +60°C (non-condensing)
- Storage and transport temperature: -40°C ... +85°C (non-condensing)
- Protection class: enclosure: IP40, terminals: IP20, terminal clearance IP54
- Mounting: snaps onto standard DIN rails to DIN EN 60715
- Resistance to shock: 30 g / 11 ms
- Resistance to vibrations to EN 60068-2-6: 10 ... 55 Hz, amplitude 0.35 mm
- Altitude: max. 2,000 m
- Dimensions (height/width/depth): 98 x 22.5 x 115 mm

### Configuration Settings

<table>
<thead>
<tr>
<th>Rotary knob position</th>
<th>Reset button (detection of the trailing edge)</th>
<th>Cross-wire monitoring active</th>
<th>Sensor</th>
<th>Input / Sensor configuration</th>
<th>Monitoring of sensor channels for synchronisation (&lt; 5 sec.)</th>
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</tbody>
</table>

For more information, see our online product catalog: www.usa.schmersal.net
Safety monitoring modules

SRB-E-301ST

- Electronic safety controller
- 3 instant relay safety outputs
- 1 signaling relay output
- 10 configuration settings adjusting reset, cross-wire detection, input/output configuration.
- LED status indication
- Plug-in terminals
- Coded plug-in terminal blocks

Technical data

Standards: IEC/EN 60204-1, EN 60947-5-1; EN ISO 13849-1, IEC/EN 62061, IEC 61508

EMC rating: to EMC Directive

Air clearances and creepage distances: to IEC/EN 60664-1

Mounting: standard DIN rail to EN 60715

Terminal designations: EN 60947-1

Electrical characteristics:
- Rated operating voltage $U_e$: 24 VDC / 24 VAC – 20%/+20%
- Frequency range: 50 Hz/60 Hz
- Fuse rating for the operating voltage: we recommend a circuit breaker type Z (max. 16 A), or a fine fuse (max. 15 A, delayed action)

UL Rating of external fuse: max. 16 A, only use fuses in accordance with UL 248 series

Pull-in delay: < 150 ms

Drop-out delay in case of "emergency stop": < 10 ms

Drop-out delay on "supply failure": < 10 ms

Bridging in case of voltage drops: typ. 5 ms

Readiness after switching on voltage [s]: < 1.5 sec.

Control current circuits/inputs:
- Inputs S12, S22: 24 VDC/8 mA
- Inputs X2, X3, X7: 24 VDC/8 mA
- Clock outputs S11, S21: > 20 VDC, 10 mA per output
- Cable length: 1500 m with 1.5 mm²; 2500 m with 2.5 mm²
- Conduction resistance: max. 40 Ω

Relay outputs:
- Switching capacity of the safety contacts: contacts 13-14, 23-24, 33-34: min: 10 VDC / 10 mA, max: 250 V, 6 A ohms,
- Fuse rating of the safety contacts: external (Ik = 1000 A) to EN 60947-5-1 Safety fuse 10 A quick blow, 6 A slow blow
- Utilisation category to EN 60947-5-1: AC-15: 230 V / 4 A
- Switching capacity of the auxiliary contacts: 41-42: 24 VDC / 1 A
- Fuse rating for the auxiliary contact: safety fuse 2.5 A quick blow, 2 A slow blow
- Mechanical life: 10 million operations
- Safety contact values: resistance max. 100 mΩ, AgNi, self-cleaning, positive action
- Max. switching cycles / minute: 20

Ambient conditions:
- Operating ambient temperature: -25°C … +60°C (non-condensing)
- Storage and transport temperature: -40°C … +85°C (non-condensing)
- Protection class: enclosure: IP40, terminals: IP20, terminal clearance IP54
- Mounting: snaps onto standard DIN rails to DIN EN 60715
- Resistance to shock: 30 g / 11 ms
- Resistance to vibrations to EN 60068-2-6: 10 ... 55 Hz, amplitude 0.35 mm
- Altitude: max. 2,000 m
- Dimensions (height/width/depth): 98 x 22.5 x 115 mm

Configuration Settings

<table>
<thead>
<tr>
<th>Rotary knob position</th>
<th>Reset button (detection of the trailing edge)</th>
<th>Cross-wire monitoring active</th>
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</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

For more information, see our online product catalog: www.usa.schmersal.net
Safety monitoring modules

**SRB-E-212ST**

- Electronic safety controller
- **Time delayed safety outputs**
- 2 instant relay safety outputs
- 1 delayed semi-conductor safety output
- 2 signaling semi-conductor outputs
- 10 configuration settings adjusting reset, cross-wire detection, input/output configuration
- LED status indication
- Coded plug-in terminal blocks
- Safe monitoring of E-STOP, safety guards, magnetic safety sensors, pull-wire emergency stops, electronic devices with OSSD

## Technical data

- **Standards:** IEC/EN 60204-1, EN 60947-5-1; EN ISO 13849-1, IEC/EN 62061, IEC 61508
- **EMC rating:** to EMC Directive
- **Air clearances and creepage distances:** to IEC/EN 60664-1
- **Mounting:** standard DIN rail to EN 60715
- **Terminal designations:** EN 60947-1
- **Electrical characteristics:**
  - **Rated operating voltage** \(U_e\): 24 VDC ±20%, residual ripple max. 10%
  - **Fuse rating for the operating voltage:** we recommend a circuit breaker type Z (max. 16 A) or a fine fuse (max. 15 A, delayed action)
  - **UL Rating of external fuse:** max. 16 A, only use fuses in accordance with UL 248 series
- **Pull-in delay:** < 150 ms
- **Drop-out delay in case of "emergency stop":** < 10 ms
- **Drop-out delay on "supply failure":** < 10 ms
- **Bridging in case of voltage drops:** typ. 5 ms
- **Readiness after switching on voltage [s]:** < 1.5 sec.
- **Control current circuits/inputs:**
  - Inputs S12, S22: 24 VDC/8 mA
  - Inputs X2, X3, X7: 24 VDC/8 mA
  - Clock outputs S11, S21: > 20 VDC, 10 mA per output
- **Cable length:** 1500 m with 1.5 mm²; 2500 m with 2.5 mm²

### Drop-out delay settings (seconds)

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<tr>
<th>Drop-out delay settings (seconds)</th>
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<th>0.5</th>
<th>1.0</th>
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<th>2.5</th>
<th>3.0</th>
<th>4.0</th>
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<tbody>
<tr>
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<td>12.0</td>
<td>15.0</td>
<td>20.0</td>
<td>25.0</td>
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</tbody>
</table>

- **Relay outputs:**
  - Switching capacity of the safety contacts: contacts 13-14, 23-24:
  - min: 10 VDC / 10 mA, max: 250 V, 6 A ohms,
  - Fuse rating of the safety contacts: external (\(I_k = 1000\) A) to EN 60947-5-1
  - Safety fuse 10 A quick blow, 6 A slow blow
  - Fuse rating for the auxiliary contact: safety fuse 2.5 A quick blow, 2 A slow blow
  - Mechanical life: 10 million operations
  - Safety contact values: resistance max. 100 mΩ, AgNi, self-cleaning, positive action
  - Max. switching cycles / minute: 20
  - **Semi-conductor outputs:**
  - Switching capacity of the safety outputs: Qi1: max. 2 A
  - Voltage drop: < 0.5 V
  - Leakage current: < 1 mA
  - Max. fuse rating of the safety outputs: refer to “Operating voltage”
  - Test impulse of the safety outputs: < 1 ms (negative), < 100 μs (positive)
  - Utilization category to EN 60947-5-1: DC-13: 24 V / 2 A
  - Switching capacity of signaling outputs: semi-conductor outputs Y1, Y2: 24 VDC/100 mA
  - Fuse rating of the signaling outputs: internal electronic trip, tripping current > 100 mA
  - Mechanical life: 10 million operations
  - Max. switching cycles / minute: 20
  - Inductive consumers: provision is to be made for suitable protective wiring for suppression

## Configuration Settings

<table>
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<tr>
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<td>1</td>
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</table>

For more information, see our online product catalog: www.usa.schmersal.net
Safety monitoring modules

SRB-E-322ST

- Electronic safety controller
- Time delayed safety outputs
- 3 instant relay safety outputs
- 2 delayed semi-conductor safety outputs
- 1 signaling relay output
- 1 signaling semi-conductor output
- 10 configuration settings adjusting reset, cross-wire detection, input/output configuration
- LED status indication
- Coded plug-in terminal blocks
- Safe monitoring of E-STOP, safety guards, magnetic safety sensors, pull-wire emergency stops, electronic devices with OSSD

Technical data

Standards:
IEC/EN 60204-1, EN 60947-5-1, EN ISO 13849-1,
IEC/EN 62061, IEC 61508

EMC rating:
to EMC Directive

Air clearances and creepage distances:
to IEC/EN 60664-1

Mounting:
standard DIN rail to EN 60715

Terminal designations:
EN 60947-1

Electrical characteristics:
Rated operating voltage $U_e$: 24 VDC ±20%, residual ripple max. 10%
Fuse rating for the operating voltage: we recommend a circuit breaker type Z (max. 16 A) or a fine fuse (max. 15 A, delayed action)
UL Rating of external fuse: max. 16 A, only use fuses in accordance with UL 248 series

Pull-in delay: < 150 ms
Drop-out delay in case of "emergency stop": < 10 ms
Drop-out delay on "supply failure": < 10 ms
Readiness after switching on voltage [s]: < 1.5 sec.

Control current circuits/inputs:
Inputs S12, S22: 24 VDC/8 mA
Inputs X2, X3, X7: 24 VDC/8 mA

Clock outputs S11, S21: > 20 VDC, 10 mA per output

Cable length: 1500 m with 1.5 mm²; 2500 m with 2.5 mm²

Conduction resistance: max. 40 Ω

Relay outputs:
Switching capacity of the safety contacts: contacts 13-14, 23-24, 33-34:
Fuse rating of the safety contacts: external (Ik = 1000 A) to EN 60947-5-1
Safety fuse 10 A quick blow, 6 A slow blow

Utilization category to EN 60947-5-1:
AC-15: 230 V / 4 A, DC-13: 24 V / 4 A

Switching capacity of the auxiliary contacts:
41-42: 24 VDC / 1 A

Fuse rating for the auxiliary contact:
safety fuse 2.5 A quick blow, 2 A slow blow

Mechanical life:
10 million operations

Safety contact values:
resistance max. 100 mΩ, AgNi, self-cleaning, positive action

Max. switching cycles / minute: 20

Semi-conductor outputs:
Switching capacity of the safety outputs: Qt1, Qt2: max. 2 A
Voltage drop: < 0.5 V
Leakage current: < 1 mA
Max. fuse rating of the safety outputs:
refer to "Operating voltage"
Test impulse of the safety outputs:
< 1 ms (negative), < 100 μs (positive)

Utilization category to EN 60947-5-1:
DC-13: 24 V / 2 A

Switching capacity of signaling outputs:
semi-conductor outputs Y2: 24 VDC/100 mA
Fuse rating of the signaling outputs:
internal electronic trip, tripping current > 100 mA

Mechanical life:
10 million operations

Max. switching cycles / minute: 20

Inductive consumers:
 provision is to be made for suitable protective wiring for suppression

Configuration Settings

<table>
<thead>
<tr>
<th>Rotary knob position</th>
<th>Reset button (detection of the trailing edge)</th>
<th>Cross-wire monitoring active</th>
<th>Input / Sensor configuration</th>
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<tbody>
<tr>
<td>1</td>
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Safety monitoring modules

**SRB-E-204PE**

- Electronic safety input expander
- 2 instant semi-conductor outputs
- 4 signaling semi-conductor outputs
- Monitoring of up to 4 safety devices
- 9 configuration settings adjusting reset, cross-wire detection, input/output configuration
- LED status indication
- Coded plug-in terminal blocks
- Safe monitoring of E-STOP, safety guards, magnetic safety sensors, pull-wire emergency stops, electronic devices with OSSD

### Technical data

**Standards:**
- IEC/EN 60204-1, EN 60947-5-1; EN ISO 13849-1, IEC/EN 62061, IEC 61508
- to EMC Directive
- to IEC/EN 60664-1
- standard DIN rail to EN 60715
- EN 60947-1

**Rated operating voltage \( U_e \):** 24 VDC ±20%, residual ripple max. 10%

**Fuse rating for the operating voltage:**
- we recommend a circuit breaker type Z (max. 16 A)
- or a fine fuse (max. 15 A, delayed action)

**UL Rating of external fuse:**
- max. 16 A, only use fuses in accordance with UL 248 series

**Pull-in delay:** < 150 ms

**Drop-out delay in case of "emergency stop":** < 10 ms

**Drop-out delay on "supply failure":** < 10 ms

**Bridging in case of voltage drops:** typ. 5 ms

**Readiness after switching on voltage [s]:** < 1.5 sec.

**Control current circuits/inputs:**

- Inputs S12, S22: 24 VDC/8 mA
- Inputs X2, X3, X7: 24 VDC/8 mA
- Clock outputs S11, S21: > 20 VDC, 10 mA per output
- Cable length: 1500 m with 1.5 mm²; 2500 m with 2.5 mm²
- Conduction resistance: max. 40 Ω

**Semi-conductor outputs:**

- Switching capacity of the safety outputs \( Q \): max. 2 A
- Voltage drop: < 0.5 V
- Leakage current: < 1 mA
- Max. fuse rating of the safety outputs: refer to "Operating voltage"
- Test impulse to \( Q_1, Q_2 \): 1 ms (negative); < 100 μs (positive)
- Utilization category as per EN 60947-5-1: DC-13: 24 V / 2 A
- Switching capacity of signaling outputs: semi-conductor output Y1-Y4: 24 VDC/100 mA
- Fuse rating of the signaling outputs: internal electronic trip, tripping current > 100 mA
- Max. switching cycles / minute: 60

**Ambient conditions:**

- Operating ambient temperature: -25°C ... +60°C (non-condensing)
- Storage and transport temperature: -40°C ... +85°C (non-condensing)
- Protection class: enclosure: IP40, terminals: IP20, terminal clearance IP54
- Mounting: snaps onto standard DIN rails to DIN EN 60715
- Resistance to shock: 30 g / 11 ms
- Resistance to vibrations to EN 60068-2-6: 10 ... 55 Hz, amplitude 0.35 mm
- Altitude: max. 2,000 m
- Dimensions (height/width/depth): 98 x 22.5 x 115 mm

### Configuration Settings

<table>
<thead>
<tr>
<th>Rotary knob position</th>
<th>Reset button with edge monitoring</th>
<th>Cross-wire monitoring active</th>
<th>Input / Sensor configuration</th>
<th>Monitoring of sensor channels for synchronisation (&lt; 5 sec.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>---</td>
<td>Yes</td>
<td>NC / NC</td>
<td>Yes</td>
</tr>
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<td>NC / NC</td>
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<td>---</td>
<td>No</td>
<td>NC / NC</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>---</td>
<td>No</td>
<td>NC / NC</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>---</td>
<td>Yes</td>
<td>NC / NO</td>
<td>Yes</td>
</tr>
<tr>
<td>6</td>
<td>---</td>
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<td>NC / NO</td>
<td>No</td>
</tr>
<tr>
<td>7</td>
<td>---</td>
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<td>NC / NC</td>
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<td></td>
<td></td>
<td>Sensor 2 -&gt; No</td>
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<td>Sensor 3 -&gt; No</td>
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<td>Sensor 4 -&gt; No</td>
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<td>NC / NC</td>
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<td>Sensor 3 -&gt; No</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sensor 4 -&gt; No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>---</td>
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<td>Sensor 3 -&gt; Yes</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td></td>
<td>Sensor 4 -&gt; No</td>
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</tr>
<tr>
<td>C</td>
<td>Configuration mode</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: [www.usa.schmersal.net](http://www.usa.schmersal.net)
Safety monitoring modules

### SRB-E-402ST

- Electronic safety controller
- Monitoring of 2 safety functions
- Configuration setting for two-hand controls
- 2 instant relay safety outputs
- 2 instant semi-conductor safety outputs
- 1 signaling relay output
- 1 signaling semi-conductor output
- 21 configuration settings adjusting reset, cross-wire detection, input/output configuration
- LED status indication
- Coded plug-in terminal blocks
- Safe monitoring of E-STOP, safety guards, magnetic safety sensors, pull-wire emergency stops, electronic devices with OSSD

### Technical data

#### Standards:
- IEC/EN 60204-1, EN 60947-5-1; EN ISO 13849-1, IEC/EN 62061, IEC 61508
- to EMC Directive
- to IEC/EN 60664-1
- standard DIN rail to EN 60715
- EN 60947-1

#### Electrical characteristics:
- Rated operating voltage \( U_e \): 24 VDC ±20%, residual ripple max. 10%
- Fuse rating for the operating voltage: we recommend a circuit breaker type Z (max. 16 A) or a fuse (max. 15 A, delayed action)
- UL Rating of external fuse: max. 16 A, only use fuses in accordance with UL 248 series
- Pull-in delay: < 150 ms
- Drop-out delay in case of "emergency stop": < 10 ms
- Drop-out delay on "supply failure": < 10 ms
- Readiness after switching on voltage [s]: < 1.5 sec.

#### Control current circuits/inputs:
- Inputs S12, S22: 24 VDC/8 mA
- Inputs X2, X3, X7: 24 VDC/8 mA
- Clock outputs S11, S21: > 20 VDC, 10 mA per output
- Cable length: 1500 m with 1.5 mm²; 2500 m with 2.5 mm²
- Conduction resistance: max. 40 Ω

#### Relay outputs:
- Switching capacity of the safety contacts: 13-14, 23-24: 13-14, 23-24: max. 250 V, 6 A ohmic, min. 10 VDC / 10 mA
- Fuse rating of the safety contacts: external (Ik = 1000 A) to EN 60947-5-1
- Safety fuse 10 A quick blow, 6 A slow blow
- Switching capacity of the auxiliary contacts: 41-42: 24 VDC / 1 A
- Fuse rating for the auxiliary contact: safety fuse, 2.5 A quick blow, 2 A slow blow
- Safety contact values: resistance max. 100 mΩ, AgNi, self-cleaning, positive action
- Mechanical life: 10 million operations

#### Semi-conductor outputs:
- Switching capacity of the safety outputs Q: max. 2 A
- Voltage drop: < 0.5 V
- Leakage current: < 1 mA
- Max. fuse rating of the safety outputs: refer to "Operating voltage"
- Test impulse to Q1, Q2: < 1 ms (negative) < 100 μs (positive)
- Utilization category to EN 60947-5-1: DC-13: 24 V / 2 A
- Switching capacity of signaling outputs: semi-conductor output Y1: 24 VDC/100 mA
- Fuse rating of the signaling outputs: internal electronic trip, tripping current > 100 mA
- Max. switching cycles / minute: 20
- Inductive consumers: provision is to be made for suitable protective wiring for suppression

#### Configuration Settings*

<table>
<thead>
<tr>
<th>Rotary knob position</th>
<th>Reset button (detection of the trailing edge)</th>
<th>Cross-wire monitoring active</th>
<th>Input / Sensor configuration</th>
<th>Monitoring of sensor channels for synchronisation (&lt; 5 sec.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>Yes</td>
<td>NC / NC</td>
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<td>Yes</td>
<td>NC / NC</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>Yes</td>
<td>No</td>
<td>NC / NC</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>Yes</td>
<td>No</td>
<td>NC / NC</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>Yes</td>
<td>Yes</td>
<td>NC / NO</td>
<td>Yes</td>
</tr>
<tr>
<td>6</td>
<td>Autostart</td>
<td>Yes</td>
<td>NC / NO</td>
<td>No</td>
</tr>
<tr>
<td>7</td>
<td>Autostart</td>
<td>Yes</td>
<td>NC / NC</td>
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<td>8</td>
<td>Autostart</td>
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<td>NC / NC</td>
<td>No</td>
</tr>
<tr>
<td>9</td>
<td>Autostart</td>
<td>No</td>
<td>NC / NC</td>
<td>Yes</td>
</tr>
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<td>10</td>
<td>Autostart</td>
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<tr>
<td>11</td>
<td>Function two-hand control type IIIC</td>
<td>Only rotary mode switch 2</td>
<td>NC, NO / NC, NO</td>
<td>&lt; 0.5 sec. (upon actuation of setting elements)</td>
</tr>
<tr>
<td>C</td>
<td>Configuration mode</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* two safety functions can be different, set individually using rotary mode switch 1 and 2
The safety control system PSC1 consists of freely programmable compact safety controllers with I/O extension modules for signal processing of emergency stop switches, guard door switches, light grids and additional mechanical and electronic safety switchgear. Additionally, there is the possibility via numerous functions to monitor axes. Using the universal communications interface, a connection can be established to all standard field bus systems.

- Safe logic control according to Annex IV of the Machinery Directive 2006/42/EC
- Connection for all standard safety relays up to PLe and SIL 3
- Modular expansion with up to 272 inputs / outputs
- Secure 2 A p-switching semiconductor outputs, can be switched to secure p-/n-switching semiconductor outputs
- Freely programmable inputs / outputs, 2 A p-switching
- Safe drive monitoring according to EN 61800-5-2 (SDM – Safe Drive Monitoring) for up to 12 axes
- Universal communication interface:
  - Supports all standard fieldbus systems
  - Setting and resetting of fieldbus protocols by software
  - Safe remote I/Os via Ethernet Safety Device to Device Communication (SDDC)
  - Safe cross-communication via Ethernet Safety Master to Master Communication (SMMC)
- Integrated Schmersal SD Bus connection to the standard field bus systems
- Safety functionalities up to SIL 3 according to IEC 61508 / IEC 62061, PL e and Cat. 4 according to EN ISO 13849-1

### System Overview of PROTECT-PSC1

#### Module hierarchy
- C Controller
- E Extensions
- A Accessories

#### Group hierarchy
- 10 Safe Programmable Logic Controller
- 100 Safe Programmable Logic Controller
- 2 x Safe Drive Monitoring (SDM)
- 3 x I/O Extensions Module
- 8 x Connector
- 9 x Software and accessories

#### Options
- SDM1 Safe Drive Monitoring for 1 axis
- SDM2 Safe Drive Monitoring for 2 axes
- FB1 Ethernet based fieldbus system
- FB2 Standard based fieldbus system 1)
- MC Memory Card (SDHC)
- XY DI XY=Numbers, Digital Input
- XY DIO XY=Numbers, Digital Input/Output
- XY RO XY=Numbers, Relay Output
- XY DO XY=Numbers, Digital Output
- RIO Remote I/O module

### PROTECT PSC1 - Programmable modular safety controller

#### Compact safety controllers
- PSC1-C-10
- PSC1-C-10 SDM1
- PSC1-C-10 SDM2
- PSC1-C-10 MC
- PSC1-C-10 FB1
- PSC1-C-10 FB2

#### I/O expansion modules (central expansion)
- PSC1-C-100
- PSC1-C-100 SDM1
- PSC1-C-100 SDM2
- PSC1-C-100 MC
- PSC1-C-100 FB1
- PSC1-C-100 FB2

#### Expansion modules
- Remote I/O expansion modules (decentral expansion)
- PSC1-C-100 SDM1-
- PSC1-C-100 SDM2-

#### Safe Drive Monitoring modules
- PSC1-C-100 SDM1-1
- PSC1-C-100 SDM2-1

#### 1) under preparation

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### System Overview of PROTECT-PSC

The PSC power* and PSC-CPU-MON modules with 8 safe inputs and 6 safe outputs form the basic configuration for PROTECT-PSC. PSC-Power - primary power for PSC System PSC-Booster - necessary for systems larger than 9 modules

Expand safety with:
- Safe input modules
  - PSC-S-IN-E and PSC-S-IN-LC
- Expand operationally (right, gray terminals) with:
  - Safe output modules
  - PSC-S-IN-OUT and PSC Relay
  - Safe input/output modules
  - PSC-SUB-MON, PSC-STP-E, PSC-STP-LC and PSC-S-STP-ELC

Expand operationally (right, gray terminals) with:
- Operational input modules
  - PSC-NS-IN
- Operational output modules
  - PSC-NS-OUT

<table>
<thead>
<tr>
<th>Module</th>
<th>Number of single channel inputs</th>
<th>Number of single channel outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Safe signals with dry contacts</td>
<td>Safe signals with dry contacts</td>
</tr>
<tr>
<td></td>
<td>Dry</td>
<td>Nonfloating</td>
</tr>
<tr>
<td>PSC-CPU-MON</td>
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</tr>
<tr>
<td>PSC-SUB-MON</td>
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<tr>
<td>PSC-S-STP-E</td>
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<td>—</td>
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<td>PSC-S-STP-LC</td>
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</tr>
<tr>
<td>PSC-S-STP-ELC</td>
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<td>PSC-S-Relay</td>
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<td>PSC-S-IN-LC</td>
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</tr>
<tr>
<td>PSC-S-OUT</td>
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<tr>
<td>PSC-NS-IN</td>
<td>16</td>
<td>—</td>
</tr>
<tr>
<td>PSC-NS-OUT</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

* The dry or non-floating information refers to the technical properties of the input signals:
  - Dry-contacts input signals, e.g. from emergency stop control devices, safety switches, interlocking devices, safety solenoid switches and similar.
  - Non-floating input signals, e.g. PNP outputs from optoelectronic protective devices such as safety light curtains, laser scanners etc., but also from safety sensors from Schmersal CSS or AZM200 ranges.
  - Selectable, input signals are monitored without cross short recognition. Outputs from optoelectronic protective devices can be directly connected, or dry contacts can be monitored up to a PLd.

** Maximum current per output with resistive load.

For complete technical information, please visit www.usa.schmersal.net
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<th>Appendix Section</th>
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<td>Safety Standards</td>
<td>A-5</td>
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<td>Selected conversions</td>
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<td>Ingress protection ratings</td>
<td>A-9</td>
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<td>Safety distance</td>
<td>A-10</td>
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<tr>
<td>General terms</td>
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<tr>
<td>Websites and catalogs</td>
<td>A-14</td>
</tr>
</tbody>
</table>
Glossary of Common Safety Terms

A

Authorized Output: an output from a safety controller's positive-guided relays (used to "authorize" or "enable" a machine's start circuit when safety system conditions exist). Also known as "safety output."

Automatic Reset: a safety controller reset circuit that automatically resets the safety controller when safe system conditions (no system faults) exist. A manual reset button is optional.

Auxiliary Output: a non-safety related contact closure or semiconductor output primarily used for signaling component or system status to a PLC, audible alarm or visual indicator (such as a stack light). Also called a "signaling contact" or "auxiliary monitoring contact".

ANSI (American National Standards Institute): an association of industry representatives who, working together, develop safety and other technical standards.

Auxiliary monitoring contact: See "auxiliary output".

B

BG (Berufsgenossenschaft): an independent German insurance agency whose legislative arm recommends industry safety practices. One of many "notified bodies" authorized to certify that safety products comply with all relevant standards.

C

CE (Conformité Européenne) mark: a symbol (CE) applied to finished products and machinery indicating it meets all applicable European Directives. For electrical and electronic "finished products", such as a safety relay module, these include the Low Voltage Directive and, where relevant, the Electromagnetic Compatibility (EMC) Directive.

Coded Magnet Sensor: a two-piece position sensor consisting of an array of Reed switches and a multiple magnet array-actuating element. Such devices will only deliver an output signal when the Reed switch element is in the presence of a matched, multiple-magnetic field array. Coded-magnet sensors cannot be actuated using a simple magnet. Hence they are far more difficult to defeat/bypass than a simple magnetic switch or proximity sensor.

Control Reliability: A term applied to safety devices or systems which are designed constructed and installed such that the failure of a single component within the device or system does not prevent normal machine stopping action from taking place... but does prevent a successive machine cycle from being initiated.

CSA (Canadian Standards Association): an independent Canadian testing and standards-making organization similar to Underwriters Laboratories (UL) in the U.S. "CSA-certified" products meet relevant CSA electrical and safety standards.

D

Declaration of Conformity: a manufacturer's self-certified document, signed by a highly-positioned technical manager, which lists all the Standards and Directives to which a product conforms. A Declaration of Conformity is mandatory for all CE-marked products, and for machine components which, if they fail, could lead to a dangerous or hazardous situation on a machine.

Defined Area: a predetermined area scanned by a light beam within which the presence of an opaque object of specified minimum size will result in the generation of a control signal.

Direct Action Contacts: See "positive break" contacts.

Diverse Redundancy: the use of different components and/or different microprocessor instruction sets written by different programmers in the design and construction of redundant components/circuits. Its purpose is to increase system reliability by minimizing the possibility of common-mode failure (the failure of like components used in redundant circuits).

Dual Channel Safety System: a safety control system characterized by two inputs; each connected to one of two independent safety circuits. Dual-channel systems are typically capable of detecting interconnection wiring faults such as open circuits, short-circuits and ground faults. As such they provide a higher level of safety than single-channel systems.

E

Electronic Safety Sensor: A safety switch that uses non-contact communication between the safety sensor and the actuator. Provides a large switching distance, a high degree of fail-safety, and tamper resistance. Contains a microprocessor to provide continual internal function tests and monitor safety outputs, and allows intelligent diagnostic as well as fast failure detection.

Emergency Stop (E-Stop): A manual device allowing an operator to safely stop a machine in an emergency situation.

European Machinery Directive (EMD) 2006/42/EC: a set of machine safety design requirements which must be satisfied to meet the Essential Health and Safety standards established by the European Economic Community. This Directive, and other relevant European Directives (such as the Low Voltage Directive, EMC Directive, et al) must be satisfied for the machine to bear the CE mark.

F

Fail-to-Danger: a component or system failure which allows a machine to continue operating, exposing personnel to a hazardous or unsafe condition.

Fail-to-Safe: a component failure causes the device/system to attain rest in a safe condition.

Fault Detection: the monitoring of selected safety system components whose failure would compromise the functioning of the safety system. The detection of such failures is known as "fault detection." Examples are:

- a short-circuit in the safety circuit’s interconnection wiring
- an open-circuit in the safety circuit’s interconnection wiring
- a welded contact in the safety controller’s positive-guided relays
- an open machine guard

Fault Exclusion: the ability to minimize known possible component failures ("faults") in a safety system by design criteria and/or component selection. Simple examples of "excluded faults" are:

- The use of an overrated contactor to preclude the possibility of contact welding.
- Design of a machine guard such that the safety interlock switch actuator cannot be damaged.
- Selection of a suitable safety interlock switch.
- Use of positive-break safety interlock switches together with a self-monitoring safety relay module, such that the possibility of a contact weld resulting in the loss of the safety function is eliminated.

Feedback Loop: an auxiliary input on a safety controller designed to monitor and detect a contact weld in the primary machine-controlled device (e.g. motor contactor, relay, et al) having positive-guided contacts.

Force Guided Contacts: See “Positive Guided Contacts”.

Fixed Barrier Guard: See “Hard Guarding”.

Guard: a barrier that prevents entry of an individual’s hands or other body parts into a hazardous area.

H

Hard Guarding: the use of screens, fences, or other mechanical barriers to prevent access of personnel to hazardous areas of a machine. “Hard guards” generally allow the operator to view the point-of-operation.

Hazardous Area: an area of a machine or process which presents a potential hazard to personnel.
Interlock: an arrangement in which the operation of one device automatically brings about or prevents the operation of another device.

Interlocked Barrier Guard: a fixed or movable guard which, when opened, stops machine operation.

Limit Switch: switch operated by the motion of a machine part or presence of an object. They are used for control of a machine, as safety interlocks, or to count objects passing a point.

Machine Primary Control Element (MPCE): an electrically powered component which directly controls a machine’s operation. MPCE’s are the last control component to operate when a machine’s motion is initiated or stopped.

Machine Secondary Control Element (MSCE): a machine control element (other than an MPCE) capable of removing power from the hazardous area(s) of a machine.

Manual Start-Up Test: a term applied to safety controllers designed such that at least one of the system’s interlocked machine guards must be manually opened and closed (after applying power) before machine operation is authorized.

Manually Monitored Reset: a safety controller reset circuit requiring the presence of a discrete “trailing-edge” signal (24V to 0V) to activate the controller’s authorized outputs. A reset button is mandatory.

Muting: the ability to program a monitoring and/or control device to ignore selected system conditions.

Negative Mode Mounting: the mounting of a single piece safety interlock switch (e.g. a limit switch) such that the force applied to open the normally closed (NC) safety contact is provided by an internal spring. In this mounting mode the NC contacts may not open when the safety guard is “open”. Here welded/stuck contacts, or failure of a contact-opening spring, may result in exposing the machine operator to a hazardous/unsafe area. When mounted in the “negative-mode”, single-piece safety interlock switches can be easily circumvented/defeated by the operator…simply by taping down the switch actuator when the safety guard is open.

Non-Separating Guard: sensing devices such as light curtains, scanners, or pressure mats that detect the presence of operators, but do not provide a physical barrier between the operator and hazard.

Positive Opening Contacts: See “Positive-Break Contacts”.

Positive Opening Contacts: the safety guard physically forces the NC contacts to open when the guard is opened.

Positive Opening Mode: a term applied to emergency rope-pull switches designed to actuate when the rope/trigger wire is pulled and when it is pushed (goes slack). Such rope-pull switches provide a higher level of safety than units which only actuate when the trip-wire/rope is pulled.

PLC or Programmable Logic Controller: a digital computer used for automation of electromechanical processes, such as control of machinery on factory assembly lines, amusement rides, or light fixtures.

Point of Operation: the area(s) of a machine where material or the work piece is positioned and a process is performed.

Point of Operation Guarding: a device or guard installed at the interface between the operator and the point of operation which is intended to protect personnel from hazardous areas.

Position Switch: see “Limit Switch”

Positive Break Contacts: normally-closed (NC) contacts which, upon actuation, are forced to open by a non-renalistic mechanical drive mechanism. Also called “positive-opening” or “direct-action” contacts.

Positive Guided Contacts: Normally-open (NO) and normally-closed (NC) contacts which operate interdependently such that the NO and NC contacts can never be closed at the same time. They are designed such that if one of the contacts welds/sticks closed, the other contacts cannot change state. The interdependent operation between NO and NC contacts permits self-checking/monitoring of the functioning of relays and contactors featuring positive-guided contacts. Hence they are desirable in machine safety circuits where “fail-to-safe” or “control reliability” is desired. Also called “force-guided contacts”.

Positive Linkage: a term applied to roller lever, rocking lever and other switch actuating members designed such that the integrity of the linkage between the actuator and the shaft is heightened (beyond a set screw on a smooth shaft) by its mechanical design. Examples of positive-linkages are pinned, square and serrated shafts.

Positive Mode Mounting: the mounting of a single piece safety interlock switch (e.g. a limit switch) such that the non-renalistic mechanical mechanism which forces the normally-closed (NC) contacts to open is directly driven by the interlocked machine safety guard. In this mode (as opposed to “negative-mode mounting”) the safety guard physically forces the NC contacts to open when the guard is opened.

Risk Assessment: a systematic means of quantifying the relative level of danger different types of machine hazards present to the machine operator and/or maintenance personnel. This assessment is usually done in the early stages of the machine’s design to permit such hazards to be designed-out or alternatively determine the scope of the safety system needed to protect personnel from possible injury.

Safety Controller: an electronic and/or electromechanical device designed expressly for monitoring the integrity of a machine’s safety system. Such controllers are designed using positive-guided (force-guided) relays. Depending upon the model, safety controllers are capable of detecting the following types of potential safety system faults:

- Machine guard(s) open
- Guard monitoring switch/sensor failure
- Interconnection wiring “open circuit”
- Interconnection wiring “short circuit”
- Interconnection wiring “short-to-ground”
• Welded contact in controlled output device
• Failure of one of the safety controller’s positive-guided relays
• Fault in the safety controller’s monitoring circuit
• Insufficient safety controller operating voltage

Upon detection of a system fault, the safety controller will initiate a “machine stop” command and/or prevent the restarting of the machine until the fault has been corrected. The “stop” command may be immediate or time-delayed depending upon the model safety controller selected.

Safety Distance: for the proper placement of non-separating guards, a calculation of factors such as approach speed and system reaction time, to insure that the machine stops before the hazard is reached.

Safety Enable: see “Authorized Output.”

Safety Interlock Switch: a switch designed expressly to safely monitor the position of a machine barrier guard. Such switches typically feature positive-break contacts and are designed to be more tamper-resistant than conventional position/presence-sensing switches.

Safety Output: see “Authorized Output.”

Safety Relay: an electromechanical relay designed with positive-guided contacts.

Self Checking: the performing of periodic self diagnostics on the safety control circuit to ensure that critical individual components are functioning properly.

Self Monitoring: see “Self-Checking.”

Separating guard: a panel, fence, window, or door that physically separates the operator form the hazard.

Serial Diagnostics: A system for series-wired electronic safety sensors that transmits the operational status of each participant in the chain to a central processor that is connected to conventional and commercially available PLC systems. It provides fast and accurate error messages with detailed information about the failure.

Single Channel Safety System: a safety control system characterized by one safety interlock switch whose normally closed contact is the sole input to a safety controller or a motor contactor. Such systems are unable to detect a short circuit failure in the interconnection wiring and are only recommended for addressing Safety Categories B, 1 and 2 (see “Risk Assessment”).

Solenoid Latching Safety Interlock Switch: a two-piece safety interlock (actuating key and switch mechanism) whose design prevents the removal of the actuating key until released by an integral latching solenoid. Solenoid latching is typically controlled by a time-delay, motion detector, position sensor or other control components.

Stop Category “0”: immediate removal of power from the controlled devices.

Stop Category “1”: removal of power after a time delay, up to 30 seconds. This is commonly used with drive systems where immediate removal of power may result in a longer stop time.

SRPCS (Safety Related Parts of Control Systems): systems or subsystems which perform a safety function.

Tamper Resistant: a term applied to safety interlock switches referring to their relative ability to be defeated or bypassed using simple, readily available means such as a screwdriver, paper clip, piece of tape or wire, etc. Switches and sensors designed expressly for use as machine guard safety interlocks are designed to be more “tamper-resistant” than conventional switches/sensors (e.g. proximity switches, reed switches, conventional limit switches).

Time Delayed Authorized Outputs: a safety controller’s authorized outputs whose activation is delayed (up to 30 seconds) to satisfy Stop Category 1 requirements.

Trailing Edge Reset: (See “Manually Monitored Reset.”)

Two Hand Control: a machine control system which requires “simultaneous” use of both of the operator’s hands to initiate a machine cycle.

UL (Underwriters Laboratories): an independent testing and standards-making organization. UL tests products for compliance to relevant electrical and safety standards/requirements.
Machinery Safety Standards

EUROPEAN STANDARDS

The European safety requirements for man and machine are established in the European Machinery Directive (EMD). According to the EMD, machinery must be designed and built to meet the Directive’s requirements as defined by existing and emerging European standards. These “European Norms”, prepared by representatives of the European Economic Community (EEC) member states and produced by the European standards committees CEN and CENELEC, provide a harmonized baseline for the design and construction of safe machinery.

As of January 1, 1997, machinery sold into or within the EEC must comply with the requirements of the European Machinery Directive. Equipment which complies may be affixed with the CE mark (for “Conformité Européenne”). The CE mark on a machine signifies that it conforms to the essential health and safety requirements defined by the relevant European Norms.

These “Norms” form a hierarchical structure which include:

Type A Standards: Fundamental Safety Standards which contain basic concepts, principles of design, and general aspects applicable to all machinery.

Type B Standards: Group Safety Standards, each of which focuses on a specific subject applicable to a range of machinery types. “B1 Standards” cover a specific safety aspect defined in the Fundamental Standards. “B2 Standards” cover the requirements of specific safety related devices such as two-hand controls, interlocking devices, movable guards, etc.

Type C Standards: Specific Machine Safety Standards, each of which define protective measures required for hazardous areas of a specific machine or group of machines.

Type A and Type B Standards are intended to assist in the machinery design process, and eliminate the need to repeat these general requirements in the machine- specific (Type C) Standards.

Many product standards are still in the planning stage and the number of Type C Standards is continuously increasing. Some are still in draft form (designated as “prEN” standards). Others exist as finished (“EN”) standards.

Where no machine-specific standard exists, the requirements of the Machinery Directive can be satisfied by observing existing European Standards and relevant national standards/ specifications. Draft standards (prEN) published by the European Union are also accepted and used as a basis for evaluating products for compliance to the Directives. It is important to note that such draft standards may change before being finalized and adopted as EN standards.

Selected European Standards

Type “A” Standards:

Type “B1” Standards:
EN ISO 13849-1 Safety of Machinery – Safety-Related Parts of Control Systems – Part 1: General Principles for Design
EN ISO 13857 Safety of Machinery – Safety Distances to Prevent Danger Zones from Being Reached by Upper and Lower Limbs.

EN349 Safety of Machinery – Minimum Gaps to Avoid Crushing of Parts of the Human Body.

Type “B2” Standards:
prEN61496 Safety of Machinery – Electrosensitive Protective Equipment.

Type “C” Standards:
EN415 Packaging Machines
EN692 Mechanical Presses
EN693 Hydraulic Presses
EN746 Thermoprocessing Machines
EN931 Footwear Manufacturing Machines
EN1114-1 Rubber & Plastics Machines
EN1672 Food Processing Machines

SOURCE FOR STANDARDS

EN & IEC Standards are available from: Global Engineering Documents
15 Inverness Way East
Englewood, CO 80112
Telephone: (800) 854-7179
US STANDARDS

In the United States, the protection of workers is the primary concern of OSHA, the Occupational Health and Safety Administration, a division of the Department of Labor. OSHA’s role is to assure safe and healthful working conditions for working men and women; by authorizing enforcement of the standards developed under the Occupational Safety & Health Act; by assisting and encouraging the States in their efforts to assure safe and healthful working conditions; by providing for research, information, education, and training in the field of occupational safety and health. OSHA is the primary regulatory agency for safety and health, setting national standards and providing for the enforcement thereof. OSHA also relies on consensus standards. These are guidelines and standards created by standards-making organizations, trade associations, and third party testing facilities. In the machinery industry, these include: American National Standards Institute (ANSI), Robotics Industry of America (RIA), Instrument Society of America (ISA), National Fire Prevention Association (NFPA), Underwriters Laboratories, Inc. (UL).

State OSH Standards

Section 18 of the Occupational Safety and Health Act of 1970 (the OSH Act) encourages states to develop and operate their own safety and health programs in the workplace. OSHA approves and monitors State Plans.

The following states have adopted safety and health standards:

- Alaska
- Arizona
- California
- Hawaii
- Indiana
- Iowa
- Kentucky
- Maryland
- Michigan
- Minnesota
- Nevada
- New Mexico
- North Carolina
- Oregon
- South Carolina
- Tennessee
- Utah
- Vermont
- Virginia
- Washington
- Wyoming

Selected US Standards and Guidelines

OSHA 29 CFR 1910.212 General Requirements for (Guarding of) All Machines
OSHA 29 CFR 1910.217 (Guarding of) Mechanical Power Presses
ISA S84.01 Safety Instrumented Systems
ANSI B11.1 Machine Tools – Mechanical Power Presses – Safety Requirements for Construction, Care, and Use of
ANSI B11.2 Hydraulic Power Presses – Safety Requirements for Construction, Care, and Use of
ANSI B11.3 Power Press Brakes – Safety Requirements for Construction, Care, and Use of
ANSI B11.4 Shears – Safety Requirements for Construction, Care, and Use of
ANSI B11.5 Machine Tools – Iron Workers – Safety Requirements for Construction, Care, and Use of
ANSI B11.6 Lathes – Safety Requirements for Construction, Care, and Use of
ANSI B11.7 Cold Headers & Cold Formers – Safety Requirements for Construction, Care, and Use of
ANSI B11.8 Drilling, Milling, and Boring Machines – Safety Requirements for Construction, Care, and Use of
ANSI B11.9 Grinding Machines – Safety Requirements for Construction, Care, and Use of
ANSI B11.10 Metal Sawing Machines – Safety Requirements for Construction, Care, and Use of
ANSI B11.11 Gear Cutting Machines – Safety Requirements for Construction, Care, and Use of
ANSI B11.12 Machine Tools – Single- and Multiple-Spindle Automatic Bar and Chucking Machines – Safety Requirements for Construction, Care, and Use of
ANSI B11.13 Machine Tools – Safety Requirements for Construction, Care, and Use of
ANSI B11.14 Coil Slitting Machines/Systems – Safety Requirements for Construction, Care, and Use of

SOURCE FOR STANDARDS

ANSI & NFPA Standards are available from:
American National Standards Institute (ANSI)
11 West 42nd Street
New York, NY 10036
Telephone: (212) 642-4900

OSHA Regulations are available from:
Superintendent of Documents
Government Printing Office
Washington, DC 20402-9371
Telephone: (202) 783-3238
In Canada, each province has its own regulatory body for occupational health and safety, such as the Ministry of Labour in Ontario. There are fourteen jurisdictions – one federal, ten provincial, and three territorial – each governing the way industrial safety is implemented and enforced in their specific province or territory. Federal legislation covers employees of the federal government and Crown agencies and corporations across Canada. In each province or territory, there is an act (typically called the Occupational Health and Safety Act, or something similar) which applies to most workplaces in that region.

Duties of Employers and Other Persons

The various Occupation Health and Safety Acts impose duties on those who have any degree of control over the workplace, the materials and equipment in the workplace, and the direction of the work force. There is a general duty on employers to take all reasonable precautions to protect the health and safety of workers. In addition, the Act and regulations set out many specific responsibilities of the employer. For example, there are duties that specifically relate to toxic substances, hazardous machinery, worker education, and personal protective equipment. There is a duty on all officers and directors of corporations to ensure that their corporations comply with the Act and regulations. The duties of workers are generally to work safely, in accordance with the Act and regulations.

Canadian Regulatory Agencies

Please find the regulatory agency in each province and territory as below:

- Alberta: Workplace Health and Safety, Alberta Employment and Immigration
- British Columbia: WorkSafeBC
- Manitoba: SAFE Manitoba
- New Brunswick: WorkSafeNB
- Newfoundland and Labrador: Occupational Health and Safety Branch, Department of Government Services
- Nova Scotia: Occupational Health & Safety Division, Nova Scotia Labour and Workforce Development
- Ontario: Occupational Health and Safety Branch, Ministry of Labour
- Prince Edward Island: Occupational Health and Safety Division, Workers’ Compensation Board
- Quebec: Commission de la santé et de la sécurité du travail du Québec (Occupational Health and Safety Commission of Quebec)
- Saskatchewan: Occupational Health and Safety Division, Saskatchewan Ministry of Advanced Education, Employment and Labour
- Yukon: Yukon Workers’ Compensation Health and Safety Board

Resources:

There is also a national Canadian Standards Association that sets safety standards which are voluntary and represent best practices. CSA standards may be enforced by law when referenced in provincial, territorial or federal legislation or regulations. These standards are designed to be complementary to the actions of government in tackling the issue of worker safety and can provide tools to help organizations comply with regulations and demonstrate due diligence.

Can/CSA-Z142-10
Code for Power Press Operation: Health, Safety, and Guarding Requirements

Can/CSA-Z432-16
Safeguarding of Machinery

Can/CSA-Z434-14
Industrial Robots and Robot Systems – General Safety Requirements

Can/CSA-Z460-13
Control of Hazardous Energy – Lockout and Other Methods

Can/CSA-Z462-15
Workplace Electrical Safety

Can/CSA-Z1002
Injury Risk Assessment and Management

Can/CSA-Z1006-16
Work in Confined Spaces

Can/CSA-Z1004-12
General Workplace Ergonomics

Can/CSA Z1000-06
Occupational Health and Safety Management

Can/CSA-Z1600-14
Emergency Management and Business Continuity Programs

Source for Standards

CSA Standards are available from:
CSA Head Office – Mississauga
5060 Spectrum Way, Suite 100
Mississauga, Ontario L4W 5N6 CANADA
## SELECTED CONVERSION FACTORS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>From</th>
<th>To</th>
<th>Multiply by</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature</strong></td>
<td>°C</td>
<td>°F</td>
<td>(°C × 9/5) + 32</td>
</tr>
<tr>
<td></td>
<td>°F</td>
<td>°C</td>
<td>°F−32 × 5/9</td>
</tr>
<tr>
<td></td>
<td>°C</td>
<td>K</td>
<td>°C + 273.18</td>
</tr>
<tr>
<td><strong>Distance</strong></td>
<td>cm</td>
<td>inches</td>
<td>0.3937</td>
</tr>
<tr>
<td></td>
<td>mm</td>
<td>inches</td>
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<tr>
<td></td>
<td>cm</td>
<td>feet</td>
<td>0.03281</td>
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<td></td>
<td>inches</td>
<td>mm</td>
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<tr>
<td></td>
<td>feet</td>
<td>cm</td>
<td>0.3048</td>
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<td>meters</td>
<td>feet</td>
<td>3.281</td>
</tr>
<tr>
<td></td>
<td>meters</td>
<td>inches</td>
<td>39.37</td>
</tr>
<tr>
<td><strong>Energy</strong></td>
<td>btu</td>
<td>gram calories</td>
<td>2.52 × 10²</td>
</tr>
<tr>
<td></td>
<td>btu</td>
<td>hp-hours</td>
<td>3.927 × 10⁻¹</td>
</tr>
<tr>
<td></td>
<td>btu</td>
<td>joules</td>
<td>1.055 × 10⁰</td>
</tr>
<tr>
<td></td>
<td>btu</td>
<td>kW-hours</td>
<td>2.928 × 10⁻⁴</td>
</tr>
<tr>
<td></td>
<td>ergs</td>
<td>btu</td>
<td>9.486 × 10⁻⁷</td>
</tr>
<tr>
<td></td>
<td>ergs</td>
<td>joules</td>
<td>1.0 × 10⁻⁷</td>
</tr>
<tr>
<td></td>
<td>ergs</td>
<td>watt-hours</td>
<td>2.773 × 10⁻¹⁰</td>
</tr>
<tr>
<td></td>
<td>foot pounds</td>
<td>btu</td>
<td>1.286 × 10⁻³</td>
</tr>
<tr>
<td></td>
<td>foot pounds</td>
<td>gm-calories</td>
<td>3.241 × 10⁻¹</td>
</tr>
<tr>
<td></td>
<td>foot pounds</td>
<td>hp-hours</td>
<td>5.05 × 10⁻⁷</td>
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<table>
<thead>
<tr>
<th>Parameter</th>
<th>From</th>
<th>To</th>
<th>Multiply by</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Force</strong></td>
<td>centigrams</td>
<td>grams</td>
<td>0.01</td>
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<tr>
<td></td>
<td>dynes</td>
<td>grams</td>
<td>0.00102</td>
</tr>
<tr>
<td></td>
<td>dynes</td>
<td>newtons</td>
<td>1.0 × 10⁻⁶</td>
</tr>
<tr>
<td></td>
<td>dynes</td>
<td>kg</td>
<td>1.02 × 10⁻⁶</td>
</tr>
<tr>
<td></td>
<td>dynes</td>
<td>pounds</td>
<td>2.248 × 10⁻⁶</td>
</tr>
<tr>
<td></td>
<td>grams</td>
<td>kilograms</td>
<td>1.0 × 10⁻³</td>
</tr>
<tr>
<td></td>
<td>grams</td>
<td>milligrams</td>
<td>1.0 × 10³</td>
</tr>
<tr>
<td></td>
<td>grams</td>
<td>oz (avdp)</td>
<td>3.527 × 10⁻²</td>
</tr>
<tr>
<td></td>
<td>grams</td>
<td>oz (troy)</td>
<td>3.215 × 10⁻²</td>
</tr>
<tr>
<td></td>
<td>grams</td>
<td>pounds</td>
<td>2.205 × 10⁻²</td>
</tr>
<tr>
<td></td>
<td>kilograms</td>
<td>dynes</td>
<td>9.80665 × 10⁻⁵</td>
</tr>
<tr>
<td></td>
<td>kilograms</td>
<td>grams</td>
<td>1.0 × 10³</td>
</tr>
<tr>
<td></td>
<td>kilograms</td>
<td>newtons</td>
<td>9.807</td>
</tr>
<tr>
<td></td>
<td>kilograms</td>
<td>pounds</td>
<td>2.2046</td>
</tr>
<tr>
<td></td>
<td>kilograms</td>
<td>oz (avdp)</td>
<td>3.5274 × 10¹</td>
</tr>
<tr>
<td></td>
<td>newtons</td>
<td>dynes</td>
<td>4.448 × 10⁻⁵</td>
</tr>
<tr>
<td></td>
<td>newtons</td>
<td>pounds</td>
<td>0.2248</td>
</tr>
<tr>
<td></td>
<td>pounds</td>
<td>dynes</td>
<td>1.0 × 10⁻⁶</td>
</tr>
<tr>
<td></td>
<td>pounds</td>
<td>grams</td>
<td>4.5359 × 10²</td>
</tr>
<tr>
<td></td>
<td>pounds</td>
<td>newtons</td>
<td>4.448</td>
</tr>
<tr>
<td></td>
<td>pounds</td>
<td>kilograms</td>
<td>4.536 × 10⁻¹</td>
</tr>
<tr>
<td></td>
<td>pounds</td>
<td>oz (avdp)</td>
<td>1.6 × 10¹</td>
</tr>
<tr>
<td></td>
<td>pounds</td>
<td>oz (troy)</td>
<td>1.458 × 10¹</td>
</tr>
</tbody>
</table>
NEMA, UL, CSA & IEC
INGRESS PROTECTION RATINGS

NEMA, UL, CSA and IEC have each established ratings systems intended to identify an enclosure’s ability to repel elements from the outside environment. These rating systems address the enclosure’s ability to protect against a variety of environmental conditions. These include:

- Incidental contact
- Rain, sleet and snow
- Windblown dust
- Hosedown and splashing liquids
- Falling dirt
- Oil or coolant spraying/splashing
- Corrosive agents
- Occasional temporary submersion
- Occasional prolonged submersion

While these ratings are intended to help you make a more informed product selection, there are some differences between each organization’s system.

As shown in Table 1, the NEMA, UL and CSA ratings most commonly used in North America are based on similar application descriptions and expected performance. However, while UL and CSA require testing in the laboratories (and periodic manufacturer site inspections to ensure continued adherence to prescribed standards), NEMA leaves compliance and certification up to the manufacturer.

While the European IEC (IP) ratings summarized in Table 2 are based on similar test methods, their performance has some slight and subtle differences in interpretation. For example, selected IP ratings permit limited ingress of water, while UL/CSA ratings do not.

For your reference and convenience we have attempted to provide an approximate cross-reference between North American enclosure ratings (NEMA, UL and CSA) and selected IEC (IP) enclosure ratings (Table 3). Please recognize that these are nearest-equivalents only and should not be considered as direct comparisons.

**TABLE 1: IEC (IP) Enclosure Ratings**

<table>
<thead>
<tr>
<th>IP</th>
<th>Tests</th>
<th>IP</th>
<th>Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No protection</td>
<td>0</td>
<td>No protection</td>
</tr>
<tr>
<td>1</td>
<td>Protected against solid objects up to 50mm, e.g. accidental touch by hands</td>
<td>1</td>
<td>Protected against vertically falling drops of water, e.g. condensation</td>
</tr>
<tr>
<td>2</td>
<td>Protected against solid objects up to 12mm, e.g. fingers</td>
<td>2</td>
<td>Protected against direct sprays of water up to 15° from vertical</td>
</tr>
<tr>
<td>3</td>
<td>Protected against solid objects over 2.5mm, e.g. tools and wires</td>
<td>3</td>
<td>Protected against sprays to 60° from vertical</td>
</tr>
<tr>
<td>4</td>
<td>Protected against solid objects over 1mm</td>
<td>4</td>
<td>Protected against water sprayed from all directions (limited ingress permitted)</td>
</tr>
<tr>
<td>5</td>
<td>Protected against dust (limited ingress, no harmful deposit)</td>
<td>5</td>
<td>Protected against low pressure jets of water from all directions (limited ingress permitted)</td>
</tr>
<tr>
<td>6</td>
<td>Totally protected against dust</td>
<td>6</td>
<td>Protected against strong jets of water</td>
</tr>
<tr>
<td>7</td>
<td>Protected against the effects of immersion between 1 cm and 1 m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Protected against the effects of immersion beyond 1 m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9K**</td>
<td>Protection against high pressure high temperature washdown applications</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 2: NEMA, UL & CSA vs. IEC (IP) Ingress Protection Ratings**

<table>
<thead>
<tr>
<th>NEMA, UL, CSA Rating</th>
<th>IEC Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP23</td>
<td>IP30</td>
</tr>
<tr>
<td>1</td>
<td>•</td>
</tr>
<tr>
<td>2</td>
<td>•</td>
</tr>
<tr>
<td>3</td>
<td>•</td>
</tr>
<tr>
<td>3R</td>
<td>•</td>
</tr>
<tr>
<td>3S</td>
<td>•</td>
</tr>
<tr>
<td>4</td>
<td>•</td>
</tr>
<tr>
<td>4X</td>
<td>•</td>
</tr>
<tr>
<td>5</td>
<td>•</td>
</tr>
<tr>
<td>6</td>
<td>•</td>
</tr>
<tr>
<td>6P</td>
<td>•</td>
</tr>
<tr>
<td>12</td>
<td>•</td>
</tr>
<tr>
<td>13</td>
<td>•</td>
</tr>
</tbody>
</table>

* These are nearest equivalents only, and should not be used to make direct conversions from IEC to NEMA classifications.

** Designed to meet DIN 40050, Part 9 (1983) Protection Type Test.

Example: IP 2 3

Characteristic letters
1st characteristic numeral (Protection against solid objects)
2nd characteristic numeral (Protection against liquids)

An enclosure with this designation is protected against the penetration of solid objects greater than 12mm and against spraying water.
Safety distances for light curtains

Between the interruption of a light beam and the standstill of the machine, a certain time expires. The safety light grid or light curtain must be sized and installed such that a stop would be signalled and the hazard ceased prior to a person or a body part accessing the hazard. The standard EN 999 provides the user with detailed information about the calculation of the minimum safety distances. These include the following important influencing factors:

• run-out time of the entire system, taking the different reaction times of the individual systems into account (e.g. machine, safety monitoring module, AOPD etc.)

• capacity of the AOPD to detect body parts (fingers, hand and entire human body)

• set-up of the safety guard in normal condition (vertical fitting), parallel condition (horizontal fitting) or at an arbitrary angle in front of the safety guard and

• the speed at which the protection field is approached.

For the calculation of the minimum safety distance $S$ to the hazardous area, EN 999 presents the following general formula:

$$S = K \times T + C$$

Where:

$S$ the safety distance to the dangerous area (mm)

$K$ the approach speed of the body or the body part (mm/s)

$T$ the entire reaction time of the system(s) (including the machine’s run-out time, the reaction time of the safety guard and the safety monitoring module etc.)

$C$ additional distance (mm) in front of the safety guard

For the calculation of the minimum safety distance $S$ to the hazardous area, EN 999 presents the following general formula:

$$S = K \times T + C$$

Normal approach for light curtains: (Resolution: max. 40 mm)

The minimum safety distance $S$ is calculated in the following way:

$$S = 2000 \times T + 8 \times (D-14)$$

($D = \text{Resolution}$)

This formula applies to safety distances up to 500 mm.

The minimum safety distance $S_{\text{min}}$ may not be less than 100 mm.

If the calculation produces a distance larger than 500 mm for $S$, the calculation can be repeated with a lower approach speed:

$$S = 1600 \times T + 8 \times (D-14)$$

In this case, $S_{\text{min}}$ may not be less than 500 mm.

If the dangerous area of the machine is accessible from the top because of its particular construction, the height $H$ of the topmost beam of the light barrier must be at least 1800 mm above the base $G$ of the machine.
Normal approach for light curtains:  
(Resolution: from 40 mm up to max. 70 mm)

The minimum safety distance $S$ is calculated in the following way:

$$S = 1600T + 850$$

The height of the topmost light beam must be at least 900 mm, the height of the lowermost light beam maximum 300 mm above the bottom (for the protection of children younger than 14: 200 mm).

Normal approach for light grids:  
(Resolution: $> 70$ mm)

The minimum safety distance $S$ is calculated using the following formula:

$$S = 1600T + 850$$

For safety guards with multiple beams, height $H$ (mm) above the reference floor of the individual beams must be applied in the following way:

<table>
<thead>
<tr>
<th>Number of beams</th>
<th>Height above the reference floor</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>400, 900</td>
</tr>
<tr>
<td>3</td>
<td>300, 700, 1100</td>
</tr>
<tr>
<td>4</td>
<td>300, 600, 900, 1200</td>
</tr>
</tbody>
</table>

When using light curtains or light grids, particular attention must be paid to the tampering possibilities of the safety guard and to the mechanical risks (e.g. crushing, shearing, cutting, ejection).

Horizontal approach for light curtains/grids  
(Resolution: $> 50$ mm)

The minimum safety distance $S$ is calculated using the following formula:

$$S = 1600T + 1200 - 0.4H$$

Here, $S_{min}$ is 850 mm. The lowest authorised height $H$ depends on the resolution $D$ of the light curtain:

$$H = 15(D-50)$$

For this type of safety guard, the maximum height $H$ is 1000 mm.

In the risk analysis, special attention must be paid to the prevention of unintentional undetected access from underneath the protection field.

Further calculation examples can be found in DIN EN 999 as well as in the mounting instructions of the SLC/SLG safety light curtains and grids.
General Terms and Conditions of Sale

ORDERS & BLANKET ORDERS
All orders must include proper description, pricing, quantity and shipping requirements. Buyer must contact the Seller’s head-quarters for terms and conditions associated with blanket orders.

PRICES
Unless otherwise stated, prices are firm for thirty days. Seller reserves the right to revise price if there is a change in quantity, size, finish, or method and time shipment differing from those indicated herein. Prices and terms on this quotation and/or acknowledgment of order are not subject to verbal changes or other agreements unless approved in writing by the Seller’s headquarters’ staff. Unless otherwise negotiated, prices for orders for future delivery will be invoiced at the prevailing price at the time of shipment.

DELIVERY
All material is sold and priced F.O.B. Hawthorne, NY, USA. Unless otherwise specified by the Buyer, all shipments will be made via UPS Ground.

MINIMUM ORDER & PACKAGING CHARGES
Unless otherwise agreed upon, the minimum order billing is $100 per shipment exclusive of shipping, insurance or other miscellaneous charges.

PAYMENT TERMS
Payment terms are net 30 days. Seller reserves the right to hold shipments to firms with unpaid past due balances. Seller also reserves the right to charge interest at the rate of 1.5% interest per month for accounts in arrears more than 30 days. This interest will never be greater than that allowed by local law.

TITLE
Title to material, priced at Seller’s shipping point, shall pass to Buyer upon shipment. Any charges for carrier for switching, demurrage or other services shall be paid by the Buyer.

CHANGES & CANCELLATIONS
Should Buyer desire to cancel, revise or suspend this order for reasons beyond the Buyer’s control, Seller shall discuss the matter promptly with the Buyer and do all possible to make a mutually satisfactory agreement. In cases where the material has been manufactured partially or completely for Buyer’s requirements, Seller will advise Buyer of charges incurred to Buyer’s account.

CLAIMS FOR DEFECTIVE MATERIALS
All material is warranted to be free from defects in quality and workmanship, and to meet the specifications to which ordered. The Seller’s obligation under this warranty is limited to repairing or replacing defective material, or crediting the Buyer with the price of the defective material. If Buyer believes the material to be defective, Buyer must notify Seller within 30 days after delivery. Seller has the right to inspect any goods before determination of a reasonable settlement. Toward this end, Buyer must contact Seller’s headquarters requesting a formal Return Material Authorization (RMA). An RMA issued by the seller is valid for 30 days, products must be returned within the 30 days. Seller will not accept any material returns without reference to the RMA number of the Buyer’s returned goods packing list.

ORDERS FOR NON-STANDARD/SPECIAL ITEMS
Unless otherwise negotiated and confirmed in writing by the Seller, orders for non-standard and special items made to the Buyer’s specifications are non-cancelable. Seller reserves the right to bill Buyer for materials purchased for the production of such items, and for all goods fully or partially manufactured at the time of notice of the Buyer’s desire to cancel the order.

SPECIAL TOOLING
Special tooling required and paid for by the Buyer shall become the property of the Buyer. Where such tooling incorporates trade secrets, it shall be held in perpetuity at the manufacturer’s premises for the exclusive use of the Buyer.

GENERAL
All agreements are contingent upon strikes, accidents, fires, availability of materials and all other causes beyond the Seller’s control. Typographical, accounting and other administrative errors are subject to correction. Buyer assumes the liability for patent and copyright infringement for goods made to Buyer’s specifications. When Buyer furnishes material for use in production, ample allowance must be made for reasonable spoilage. Such materials must be of suitable quality to facilitate efficient production. Conditions not specifically stated herein shall be governed by established trade customs. Terms inconsistent with those stated herein that may appear on the Buyer’s formal order will not be binding on the Seller.

SUSPENSIONS & CANCELLATIONS
Unless otherwise negotiated and agreed to by the Seller, the Buyer must accept final and/or complete delivery on all orders within 90 days from date of first shipment. Should the Buyer fail to accept the complete order within this or the negotiated period for order, the Seller reserves the right to cancel the order and re-bill the Buyer at the price schedule covering the total quantity of parts shipped through the date of cancellation.

WARRANTY AND LIMITATIONS OF WARRANTY:
SCHMERSAL INC. agrees to replace or repair products which have been found defective due to workmanship or material. This warranty is made only for a period within 18 months of the date of the invoice to the Buyer. This warranty applies to products which have been subjected to normal and proper usage, and to which inspection of the product by the seller shows it to be thus defective. Buyer must contact Seller’s headquarters requesting a formal Return Material Authorization (RMA) in which a detailed description of the failure or defect is required. An RMA issued by the seller is valid for 30 days, products must be returned within the 30 days. The agreement to repair or replace such a product is limited to F.O.B. shipping point and is in no way a liability for damages; direct or consequential, or for delays, installation, transportation, adjustment or other expenses arising in connection with such product. The seller is not responsible in this warranty for product which is repaired or altered. Nor is the seller responsible in this warranty for products subject to misuse, negligence, or accident. SCHMERSAL INC. is in no way liable or responsible for injuries or damages to persons or property arising from or out of use of the product within described specifications. Except for the warranty herein before stated, there are no express warranties and no implied warranties of merchantability or fitness for a particular purpose, other than those expressly set forth above. This limited warranty is in lieu of and excludes all other representations made, both express and implied, unless set forth in writing and signed by an authorized executive of SCHMERSAL INC.
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We are at your disposal - anyplace, anywhere, anytime!

Schmersal USA Website
www.schmersalusa.com
www.schmersalcanada.ca

The Schmersal homepage contains up-to-date information on general subjects, technical articles on machine safety as well as news regarding events and trainings.

Need a distributor? State by state listings of our 100+ distributors can be found in our contact section.

This and all our printed catalogs are available for download as PDFs. There is a video section with product demonstrations, webinar recordings, safety tutorials, and product animations.

Sign up for our newsletter, the Gatekeeper, or check our schedule of upcoming events.

Online Product Catalog
www.usa.schmersal.net

The online catalog is continually updated. The technical data of our entire product range are always up-to-date. Declarations of conformity, test certificates, and mounting & wiring instructions can be viewed or downloaded as well.

The online catalog can be consulted in several languages: German, English, Spanish, French, Italian, Russian, Chinese, Japanese, and more.

The online catalog also includes dimensional drawings and links to CAD images of our products - a special service to designers. In this way, they can be downloaded and directly fed in CAD systems.

Application Finder
www.applicationfinder.net/us/home/

The Application Finder displays an interactive animated packaging plant floor. Users can click on one of the work areas which will open a window with a selection of Schmersal safety switching devices that are optimal for the particular application.

Each selection ultimately links to the Schmersal online product catalog website, where users can see technical data on the selected components.

There are many product-specific animations available throughout, explaining the operation of the switch or providing recommendations for the integration of safety technology into the processes of the machine.

Also available as an app for the iPad. Download from iTunes: search Schmersal

Additional catalogs and publications available from Schmersal

GK-C Overview
Safety products

GK-A Overview
Controls & Automation

Tec. nicum
Engineering Services Brochure

Gatekeeper newsletter

AZM300 Brochure

SLC440 Brochure

AS-I Components

Command & Signaling Devices

Optoelectronic Devices

EX Explosion Proof

We are at your disposal - anyplace, anywhere, anytime!
SATECH Guarding Systems

Schmersal is proud to partner with SATECH to provide guarding solutions.

These guarding systems are of high density steel construction. Upright posts and panel frame members are a solid extrusion for extra durability. Fence mesh is constructed by 2mm diameter steel wire, arc welded at each junction. Fencing mesh is spaced 19 mm apart with cross members every 100 mm. This predominantly vertical slot opening reduces interference when trying to view processes on the far side of the fence. The design also deters workers from climbing the fence by providing no toe holds, when panels are installed with the cross pieces inside the hazardous area.

Components are finished using hard-wearing epoxy polyester powder paints. Typical constructions consist of yellow (RAL1021) upright posts with black (RAL9005) panels and accessories. Components can be produced in custom colors to meet individual customer requirements.

These systems are custom designed for each client. We collaborate on the design to meet the specific requirements of each customer, using patented software for the selection of the optimal modular components. Each design generates 3D models and a full parts list.

The custom designed solutions will include all of the necessary installation hardware. Panels and posts can be directly bolted together, or use patented adjustable clip systems. The system utilizes patented captive fastening systems, in accordance with Machinery Directive 2006/42/CE. If a panel needs to be temporarily removed, the fastening hardware will remain in place so pieces will not be lost.

The modular panels of each series are available in a wide range of sizes and option materials. Additional accessories to finish off the system include access doors, kick plates, and cable duct supports. We offer a wide range of safety locks, door handle assemblies, and safety sensors, with special mounting brackets which can be integrated into the guards for a complete safety solution.

Watch an introduction video on YouTube

For more information consult our SATECH catalog